. . . *This issue:* Blanking Dies • Screw Machine Tooling • Cold Forming • Inspection

TOOLING and PRODUCTION

PUTNAM End Mills
GIVE YOU
Maximum Utility

. . . Here's more work for your money—through effective cutting over full flute length. It's another Putnam feature that insures faster cutting, longer life. Over 1000 standard types and sizes available. See your Putnam distributor.

PUTNAM

2985 CHARLEVOIX AVENUE • DETROIT 7, MICHIGAN

CARMET *blanks are preformed to your order*

GET THE NEW CARMET CATALOG

Just out . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, punches, draw die inserts, etc.; also special preforming to order. ● *Write for your copy.*

ADDRESS DEPT. TD-31

Above are shown two carbide metal rolls of identical composition. The one at the left cost the user about nine times as much as the one at the right. That differential was due solely to grinding vs. non-grinding. The plain face needed serrating, whereas the ready-toothed face needed nothing.

In many uses where tolerances are not too critical, CARMET blanks *preformed* to your specifications are ready for service without additional costly grinding. On jobs wh finish grinding is neces the quality of Carmet's pref ing holds grinding stock minimum.

Hundreds of special sh can be preformed in Car For practical suggestions fit your needs, call or w your nearest A-L represent ● *Allegheny Ludlum Steel poration, Carmet Divi Wanda & Jarvis Aven Detroit 20, Michigan.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

AL FINE TOOL STEELS SINCE 1854

W&D 4049-B

Bellows Han-D-Air Clamp

Only $6.00 ea. $66. per doz.

- SAVES TIME in jig and fixture operations
- SAVES TIME in parts positioning
- SAVES TIME in parts ejection

Overall Size 4" x 1½" Square

The new Bellows HAN-D-AIR CLAMP is a spring return, single acting miniature air cylinder. 1⅛" bore develops 100 lbs. of pressure at 100 lbs. of air. (Power factor 1 to 1). 1" stroke. Threaded 5/16" diameter piston rod. Universal mounting: can be mounted horizontally, vertically, side, front flange, rear flange or front pivot. Overall size 4" long by 1½" square. 1/16" heavy wall brass cylinder; ⅝" heads; oil resistant "U" cup; tension balanced spring.

ORDER TODAY — Dept. TDJ 752

1463

The Bellows Co.
ESTABLISHED 1911
AKRON 9, OHIO

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

The Magazine of

TOOLING and PRODUCTION

TOOL & DIE JOURNAL

1975 Lee Road • CLEVELAND 18, OHIO

CONTENTS

Vol. XVIII, No. 4 July, 1952

Editorial INDEX	40
Editorial	43
Shop Aids	104
Publication Previews	112
Inform-A-Gram	151
Advertisers Index	153
Quick Pic	156
Progress-on-Parade	172
Contract Tooling and Production	182

Member of CCA

TOOLING and PRODUCTION is published monthly for plant operating and purchasing executives and department heads in 50 types of end product and contract manufacturing companies.

Every copy is directed to such an individual by name, by title, and by company gratis. See CAA certification.

These men, from whom emanate recommendations, requisitions and orders for needed materials, tools, equipment and accessories, comprise the Cycles of Buying Influence within their respective plants—CBI—and it is they who constitute TOOLING and PRODUCTION'S ever-vital reader circulation.

U. S. rate of subscription for schools, libraries, and individuals other than above, $6.50 per year. Foreign subscription $10.00 per year. Single copy $.75.

EDITORIAL STAFF

E. WILLARD PENNINGTON.....Editor
C. F. BENNER.....Assistant Editor
W. N. NORDQUIST.....Technical Editor
M. A. L. Webster.....Editorial Assistant
A. H. EHLERS.....Contributing Editor

BUSINESS STAFF

G. J. HUEBNER.....Publisher
R. L. HUEBNER.....Sales Manager
B. C. JACKSON.....Research Manager
R. R. SCOTT.....Production Manager
E. C. JOHNSON.....Circulation Manager
E. L. BAUMEISTER...Accounting Department

HUEBNER PUBLICATIONS, INC.

GEORGE J. HUEBNER.....President
RAY L. HUEBNER.....Secretary
RUTH R. HUEBNER.....Treasurer

Publishers of

Tooling and Production ● Die Designing and Estimating ● Plastics Molds ● Thompson Materials Weight Tables ● The Know-How-Library of Tooling and Production.

Copyright 1952 by Huebner Publications, Inc.

P.L. and R. authorized

REGIONAL REPRESENTATIVES

ALTADENA, CALIF., M. D. Pugh, 2721 N. Marengo Ave., SYcamore 7-2804
CHICAGO 1, William O. Dannhausen, 333 N. Michigan Ave., FRanklin 2-4811
CINCINNATI 8, OHIO, Harold W. Haskett, 742 Elberon Ave., GRandview 4588
CLEVELAND 18, R. E. Huebner, Jerry J. Miller, 1975 Lee Road., FAirmount 1-4040
DETROIT, 2, R. F. Pickrell, 314 Stephenson Bldg., TRinity 1-0790
NEW YORK 17, H. Thayer Heaton, 141 East 44th St., MUrray Hill 2-1947
PHILADELPHIA 43, PA., James R. Corgel 5925 Chester Ave., SAratoga 9-4121

Hammond OF KALAMAZOO
GOOD MACHINERY SINCE '82

FAST ACCURATE GRINDING
of SOLID CARBIDE INSERT TOOLS

FOR ROUNDS, SQUARES,
TRIANGULARS and RECTANGULARS

MODEL VC, Style M Motorized Solid Carbide Insert Grinding Fixture. Style H, without motor also available. Write for Bulletin No. 701.

HAMMOND MODEL CB-77 CHIP BREAKER AND DIAMOND FINISHING GRINDER can be supplied with both the standard Any Angle Vise and the Model VC Solid Carbide Insert Grinding Fixture.

THE Hammond Solid Carbide Insert Grinding Fixture pays for itself in a few weeks. Offers a fast, economical and accurate means of grinding chip breaker grooves in round, square, triangular and rectangular shapes and for rough and finish grinding of dull and damaged carbide inserts. Motorized Style M with lug base can be mounted on most tool and surface grinders and Hammond C-4, CB-76 and CB-77 Chip Breaker Grinders.

BUILDERS OF AMERICA'S MOST COMPLETE
LINE OF CARBIDE TOOL GRINDERS

Hammond Machinery Builders INC

1631 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Note the clean, straight lines of the moldings formed on the shelf by this Cincinnati Press Brake.

accurate forming on a Cincinnati solved this problem

These outstanding sectional Bulman display shelves fit accurately.
Photo courtesy E. O. Bulman Mfg. Co., Inc., Grand Rapids 2, Michigan.

Accurate forming paid off in three ways for Bulman Company, manufacturers of steel display shelves.

Trouble had been experienced in maintaining regularity of product. Now the clean, straight line formed from end to end of the shelving permits a perfect match-up of sections, eliminating a costly trim piece.

Better product, with no discards, and one piece completely eliminated, were the results when this Cincinnati Press Brake was installed . . . it was a profitable investment.

Write for Catalog B-2A—a Cincinnati Press Brake may improve your product and reduce your costs.

THE CINCINNATI SHAPER CO.
CINCINNATI 25, OHIO U.S.A.
SHAPERS · SHEARS · BRAKES

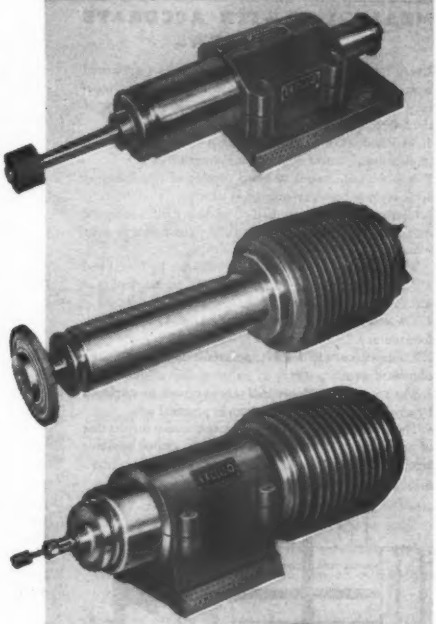
CINCINNATI

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

Specify EX-CELL-O Precision Spindles
GRINDER MANUFACTURERS DO!

You can insure the accuracy of your grinding equipment as many grinder manufacturers do —by standardizing on Ex-Cell-O Precision Spindles. Prominent machine tool builders install Ex-Cell-O Spindles as original equipment on internal grinders, universal grinders, surface grinders, gear grinders, tool and cutter grinders and special-purpose grinders.

Select the grinding spindles you need from the big Ex-Cell-O Spindle Catalog. If you don't have a copy write for one today on your company letterhead. There is no obligation, of course.



XLO
EX-CELL-O for PRECISION

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

51-15

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Hole Location Practices

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc. 726 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

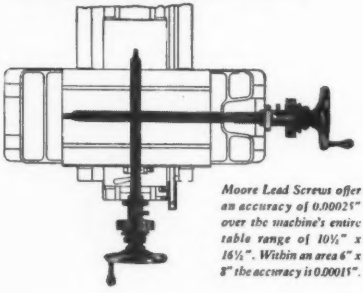
MEASURING WITH ACCURATE LEAD SCREWS

Every measuring system, whether it includes a graduated scale, end measures, or a stepped bar, depends for its accuracy on a screw. This is quite understandable, in view of the following reasons:

1. The lead screw is the only length standard capable of stepless measurement over its entire length.
2. It is the only length standard capable of translating its accuracy into both movement and location.
3. It is the only length standard which is, in itself, a complete measuring system, requiring no auxiliary equipment to make it usable.

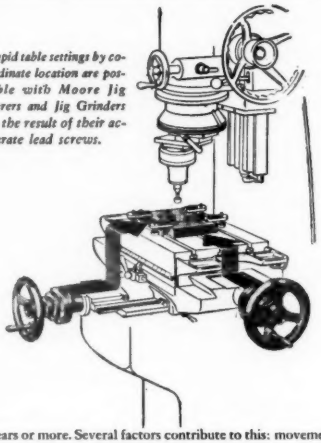
The measuring system employed in Moore Jig Borers and Moore Jig Grinders depends *only* on the accuracy of lead screws. This system has the following advantages:

1. The lead screw provides a single standard of responsibility for accuracy.
2. Elimination of additional elements cuts down unnecessary sources of error.
3. The accuracy of Moore lead screws cannot be surpassed by any other more indirect system in practical use.
4. The directness and simplicity of measurement surpass that of any other method. This is insurance against operator error, in spite of the more rapid operation possible.



Moore Lead Screws offer an accuracy of 0.00025" over the machine's entire table range of 10½" x 16½". Within an area 6" x 8" the accuracy is 0.00015".

Accurate lead screws have been installed in over 1500 Moore Jig Borers and Moore Jig Grinders. Tests made on lead screws of Moore machines, in constant use for long periods, reveal that wear on the screws is negligible for 10 years or more. Several factors contribute to this: movement of table and slide is almost frictionless, resulting in very low pressure against the threads; screws, since they are completely enclosed and lubricated through felt filtering plugs, are kept constantly clean. Screws can be checked periodically; and, if wear is found after years of use, they can be replaced at nominal costs. This could not begin to overshadow the advantages of lead screws, even if replacement were necessary more often.



Rapid table settings by coordinate location are possible with Moore Jig Borers and Jig Grinders as the result of their accurate lead screws.

TWO TOOLROOM ACES

In the Toolroom and on the Production Line, the Moore Jig Borer and Moore Jig Grinder team up for speed and accuracy. Both operate on the principle of accurate lead screws, as described above. Write today for descriptive literature on both machines and their performance. Moore Special Tool Company, Inc., 726 Union Avenue, Bridgeport 7, Conn.

With more than 100 times the wear of steel and highest corrosion resistance, Fonda Lifetime-Carbide Gage Blocks need never be replaced or recalibrated under normal usage. Acclaimed by leading manufacturers in the metal-working industry — and many others — who must have permanent precision. The unsurpassed excellence of Fonda Lifetime-Carbide Gage Blocks is further confirmed by the National Bureau of Standards.

FONDA "ULTRA-FINISH" STEEL GAGE BLOCKS — for applications requiring less wear and corrosion resistance — are made from a carefully selected grade of high-carbon tool steel which has properties for high hardness, dimensional stability, and wear resistance.

"ULTRA-FINISH" gives superior flatness and surface finish to all Fonda Gage Blocks. This exclusive machine-lapped finish makes possible effortless wringing and unbelievable adhesion. Wringing is done with the blocks clean and dry, eliminating surface films that produce errors.

Write for the new 1952 edition of our catalog: "Precision in Millionths."

82-piece set rectangular

FG

82-piece set square

FONDA

GAGE COMPANY, INC.

59 Daly Street, Stamford, Connecticut

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

HEADLINE NEWS

EXTRA... DETROIT POWER SCREWDRIVER ANNOUNCES

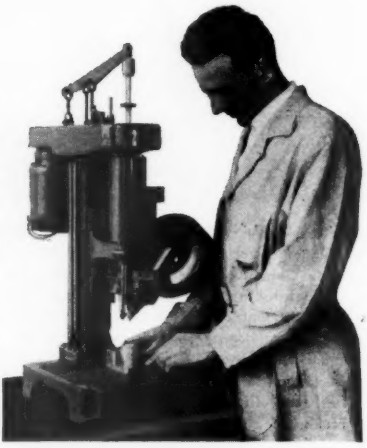
IMMEDIATE DELIVERY

No Waiting—Start Now to Benefit with These Outstanding

ASSEMBLY AIDS

ADD Phenomenal Speed and Efficiency

No need to continue slow, costly hand methods; use Detroit Power Screwdrivers and profit immeasurably by increased production and economy. Drive all types of screws with almost incredible speed, as fast as one to two seconds per screw. Detroit Power Screwdrivers play an important part in the present-day industrial capacity to produce rapidly . . . So, now that prompt deliveries are made possible, send sample assembly for production estimate at once and let our 26 years' experience as specialists in assembly problems serve your individual needs. Also receive our catalog describing in detail our complete line of POWER SCREWDRIVERS, HOPPER FEEDING UNITS, NUT DRIVERS and SPECIAL ASSEMBLING MACHINES.



Various Models to Suit Your Requirements

DETROIT POWER SCREWDRIVER CO.

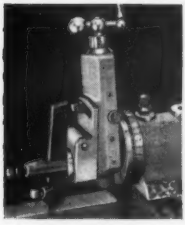
2827 W. FORT ST. DETROIT 16, MICH.

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

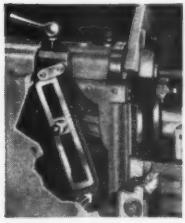
WORMS
WORM GEARS
SPIRAL GEARS
BEVEL GEARS
SPUR GEARS
CROWN GEARS
Hamilton
NO. 1 PRECISION GEAR HOBBER
With built-in accuracy, and stamina beyond average requirements, the unique feature of independent selection of speed, feed, and indexing makes possible the delivery of a selected accuracy at higher speed, or a selected speed with greater accuracy than can be achieved by other machines. We are proving this daily. Complete information is offered in our free Bulletin No. H-491. Write for it now!
THE Hamilton TOOL COMPANY
832 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

SOUTH BEND 7" PRECISION SHAPER

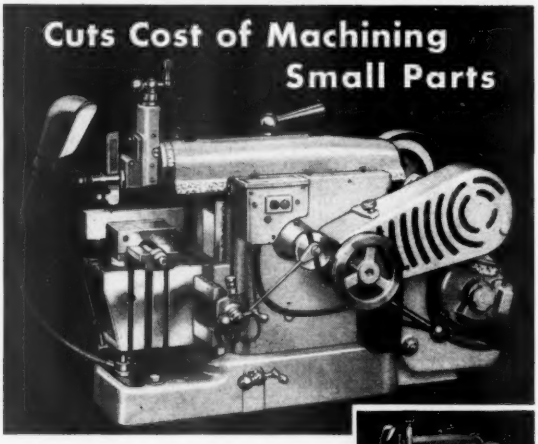


Rugged tool head locks in any position.



Graduated eccentric for stroke adjustment.

Guards on all belts and pulleys.



Saves Time... Saves Labor

It's fast—accurate—easy to operate. This shaper can consistently give you low machining costs on small parts. Its use will release your large shapers for heavier work, save on machine investment, power and maintenance. *Send coupon for literature.*

SPECIFICATIONS

RAM — Stroke length — 0 to 7". Strokes per minute (4)—42 to 195.

TOOL HEAD — Feed—3". Rotation—360°.

TABLE — 9½" horizontal travel, 5" vertical. Power cross-feeds(6)—.002" to .012". Clears ram—½" to 5½".

VISE — Jaw width — 4". Jaw depth — 1". Maximum opening — 4". Swivel base.

Steel stand—3 drawers and chip pan.

The South Bend Machine Tool line also includes 9", 10", 13", 14-1/2", 16" and 16-24" Precision Lathes and 14" Drill Presses, all available in several models.

SOUTH BEND LATHE
South Bend 22, Indiana
Building Better Tools Since 1906

Send Information Checked:

Name_____

Company_____

Street_____

City_____ State_____

☐ 7" PRECISION SHAPER ☐ LATHE ATTACHMENTS

☐ 9" and 10" BENCH LATHES

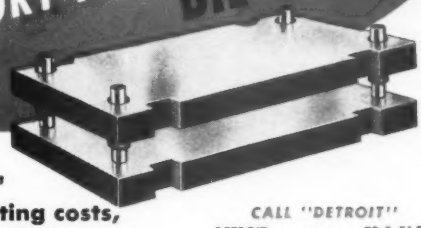
☐ 10" to 16-24" FLOOR LATHES

☐ 1/3" and 1" collet TURRET LATHES

☐ 14" DRILL PRESSES

"DETROIT" means...

FACTORY-ASSEMBLED
FACTORY-INSPECTED
DIE SETS



with "DETROIT" you save mounting costs, increase production runs

First: "Detroit" craftsmen, working with finest precision equipment, take pride in the superior quality of every "Detroit" Die Set. *Second:* Every set is fully assembled and inspected at the factory. Here are complete inspection facilities and testing skill that mean each "Detroit" Die Set is right before it is shipped.

For prompt delivery, or information, call your "Detroit" representative.

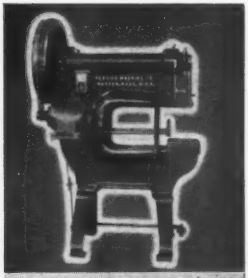
CALL "DETROIT"

DETROIT	TR 2-5150
BIRMINGHAM, ALA.	3-1341
BUFFALO	PA 9206
CHICAGO	PU 5-7694
DAYTON	HE 3042
INDIANAPOLIS	HU 5604
KANSAS CITY, MO.	VI 3558
LOS ANGELES	AD 7251
MILWAUKEE	GL 3-7170
MINNEAPOLIS	PR 1822
MONTREAL, CAN.	WI 1186
NASHVILLE	7-0437
NEWARK	MA 2-4318
PHILADELPHIA	VI 4-4084
PITTSBURGH	LO 1-4011
ROCK ISLAND, ILL.	R.I. 8-2814
ST. LOUIS	FR 6811
ST. PAUL	CE 1600
TOLEDO	MA 4510
TULSA	3-8193
WICHITA	5-8682
WINDSOR, CAN.	2-1575

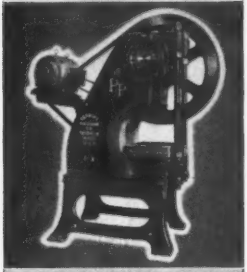
DETROIT DIE SET CORPORATION
2895 W. GRAND BLVD. • DETROIT 2, MICH.

DETROIT DIE SET ★

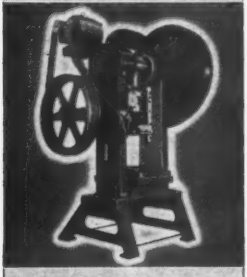
SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS



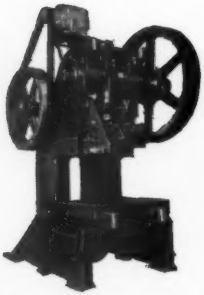
No. 10M FLYWHEEL PRESS



No. 7A PLAIN FLYWHEEL HEAVY BLANKING PRESS

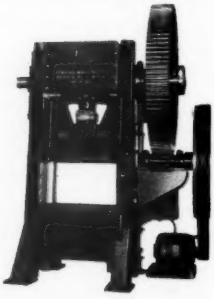


No. 91 GEARED PRESS



No. 800B GEARED INCLINABLE PRESS

Illustrating a few of the many types and sizes of standard Perkins Presses. Presses built to customers' special specifications.



No. 12-H-36 STRAIGHT SIDE, SINGLE CRANK TIE-ROD CONSTRUCTION PRESS

We welcome your inquiries

Perkins Power Presses SINCE 1885

PERKINS MACHINE CO.
WARREN, MASSACHUSETTS

Dickerman FEEDS

increase production
up to 1000%
decrease unit costs

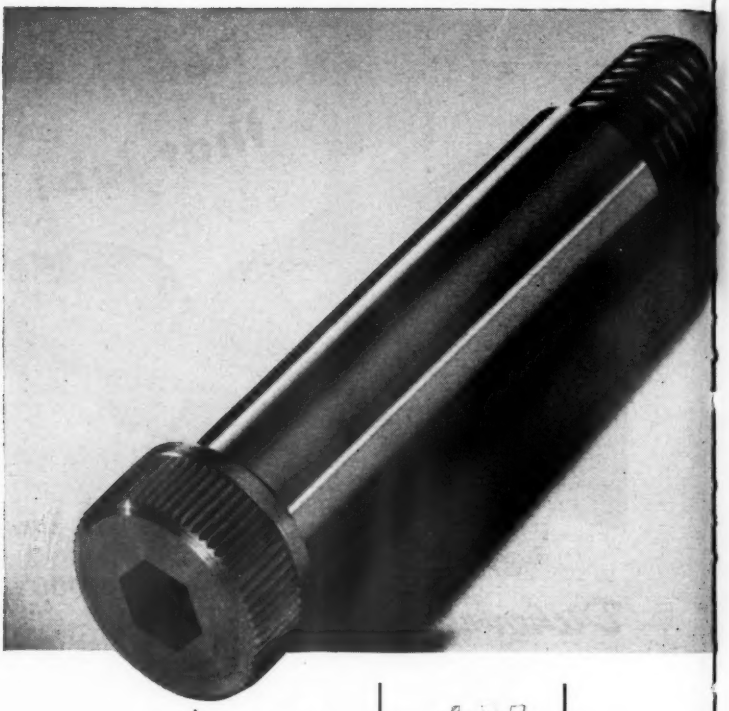
Manufacturers find the tremendous increase in production after the installation of a DICKERMAN Feed inevitably calls for retiming the job. This remarkable Feed increases the productive capacity of any Punch Press while lengthening the die life, decreasing regrinds and reducing the number of blanks and rejects.

Write for complete information today

—H. E. DICKERMAN MFG. COMPANY Dept. G, 323 Albany Street • Springfield, Mass.

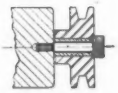
Export Address — STATES TRADING, 401 Broadway, New York 13, N. Y.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS



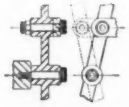
UNBRAKO

SHOULDER SCREW APPLICATIONS



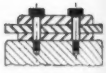
1. Stationary Shaft or Pivot

A. Idler pulley
B. Idler gear
C. Circular form tool
D. Lever, crank or linkage arm
E. Cam
F. Latch



2. Moving Shaft or Pivot

A. Linkage bar connection
B. Cam
C. Cam follower
D. Ratchet
E. Planetary gear or pinion



3. Stationary Guide

A. Locating pin in jig and fixtures
B. Latch stop
C. Alignment of stationary member
D. Linkage block
E. Grooved cam
F. Adjusting block

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

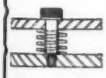
UNBRAKO SHOULDER SCREWS...

uniform, standardized, precision threaded

industrial fasteners... HAVE NUMEROUS APPLICATIONS

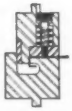
You can use these UNBRAKO Socket Head Shoulder Screws as stationary shafts or pivots, moving shafts or pivots, stationary guides, and for stripper plate and pressure pad applications. These UNBRAKO screws have shoulders held to close tolerances, finished threads close to the shoulder, and threads and heads concentric with the body. Write for descriptive literature. STANDARD PRESSED STEEL CO., Jenkintown 36, Pennsylvania.

UNBRAKO SOCKET SCREW DIVISION



Stripper Plate Uses

Blanking dies
Compound dies
Progressive compound dies
Drawing dies
Redrawing dies
Piercing and shearing dies
Combination blanking, drawing and piercing dies
Double action blanking and drawing dies



5. Pressure Pad Uses

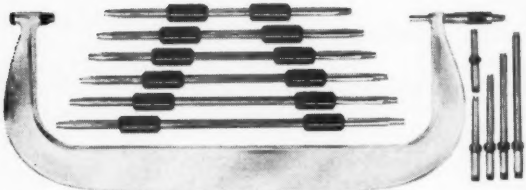
A. Cutting-off dies
B. Bending dies
C. Bending and forming dies
D. Assembly dies
E. Double action blanking and drawing dies

SPS
JENKINTOWN PENNSYLVANIA

Knurled Head Cap Screw | Self-Locking Set Screw | Flat Head Cap Screw | Shoulder Screw | Dowel Pin

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

The TUMICO Bar Micrometer



SHALLOW, TUBULAR FRAME FOR PRECISION LONG-SPAN MEASUREMENT!

The shallow frame of the Tumico Bar Micrometer slips in where frame clearance is too small for ordinary micrometers. The hollow steel frame cuts weight in half . . . makes precision measurements easy, even in the largest sizes. It is made in over 30 models ranging from 6" to 168". The Tumico Bar Micrometer can be furnished with either adjustable mandrels or sliding bar anvil.

All Tumico micrometers, gages and measuring instruments are fully and easily adjustable for wear. Skilled engineering has reduced weights up to 50%. "Feather touch" feel and balance speeds measurements and assures accuracy.

Tumico instruments control production for many of America's largest manufacturers. Consult us for special production gages, calipers, alignment instruments, etc. Catalog sent free on request.

TUBULAR MICROMETER CO.

ST. JAMES, MINNESOTA

FEATHER TOUCH

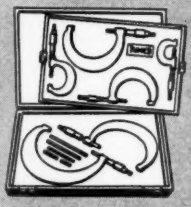
SEATTLE • LOS ANGELES • DENVER • DALLAS • CHICAGO • MINNEAPOLIS • KANSAS CITY
DETROIT • ATLANTA • NEW YORK • TORONTO, CANADA • EXPORT OFFICE: CHICAGO

FOR EVERY JOB

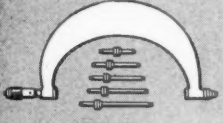
TUMICO

PRECISION MEASURING INSTRUMENTS

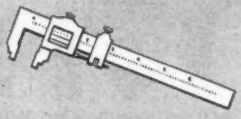
TUMICO POST GAGES
Precision micrometer or dial indicator instruments adaptable to a wide variety of uses. 10 models.



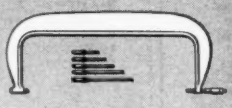
TUMICO MICROMETER SETS
Complete sets for a broad range of accurate measurement operations. From 0" to 30" in 1" steps.



TUMICO OVER-THE-BAR MICROMETERS
Precision bore measurement without removing boring bar. 11 models from 3" to 28".



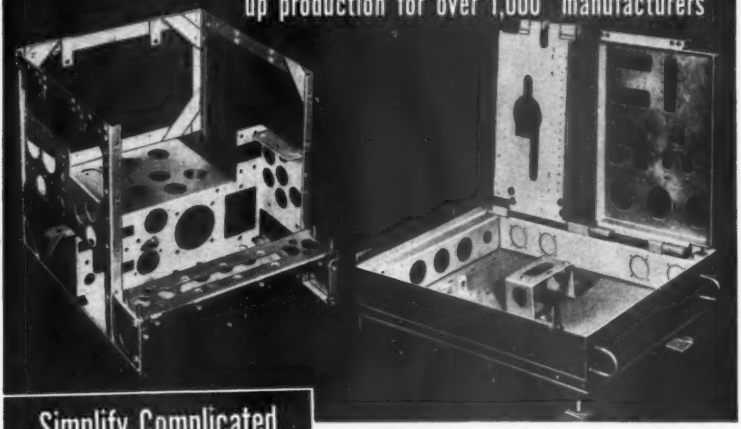
TUMICO VERNIER CALIPERS
Precision made. Accurate, clearly etched graduations and numerals. 24 models from 6" to 48".



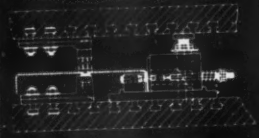
TUMICO BAR MICROMETERS
Provide a wide range of precision measurement with low investment. 30 models from 6" to 168".

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

Whistler Adjustable and Magnetic Perforating Dies are stepping up production for over 1,000 manufacturers



Simplify Complicated Piercing Operations



Use this HU-50 90 Perforating Unit on the same job with other Whistler Dies . . . often saves extra press operations.

USE WHISTLER Adjustable and Magnetic Dies for perforating, notching and slotting sheet metals . . . fast, accurate and cost cutting. Complicated patterns can be set up quickly. Hole arrangements can be changed in the press . . . without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

Re-use the same dies in different arrangements on many jobs. Punches and dies are interchangeable.

Whistler Adjustable Dies can be used in practically every type press. Standard sizes and shapes of punches and dies available up to 3 inches. Special sizes and shapes to order.

S. B. WHISTLER & SONS, Inc.

748 Military Road
Buffalo 23, New York

For prices and application data on this modern way to speed production and cut unit costs, write for these illustrated Whistler catalogs

For your convenience **Whistler direct factory representatives are located in most principal cities. Their on-the-job application experience, combined with Whistler's 35 years experience in the manufacture of tools and dies, is available on request.**

SEE ADVERTISERS INDEX. PAGE 153. FOR KEY NUMBERS

CALL Sid Tool COMPANY "HARD TO FIND TOOLS FOR STOCK DELIVERY"

Why Wait for SPECIAL TAPS?

we have them in STOCK for IMMEDIATE DELIVERY

HIGH SPEED **SPECIAL** RIGHT HAND TAPS

SIZE	THREAD
4	32-40-48-64
5	30-32-36-40-48
6	30-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	16-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40

SIZE	THREAD
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-16-20-24-26-27-28-32
13/16	16-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5-1/2-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24

SIZE	THREAD
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4-1/2 - 8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4-1/2 - 8-12-14-16-18
2-5/16	12-16
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	16
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32

SIZE	THREAD
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18

SIZE	THREAD
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4-1/2 - 10-12

- *SPECIAL AND LEFT HAND DIES IN STOCK*

Prices on Application. We are always adding new sizes

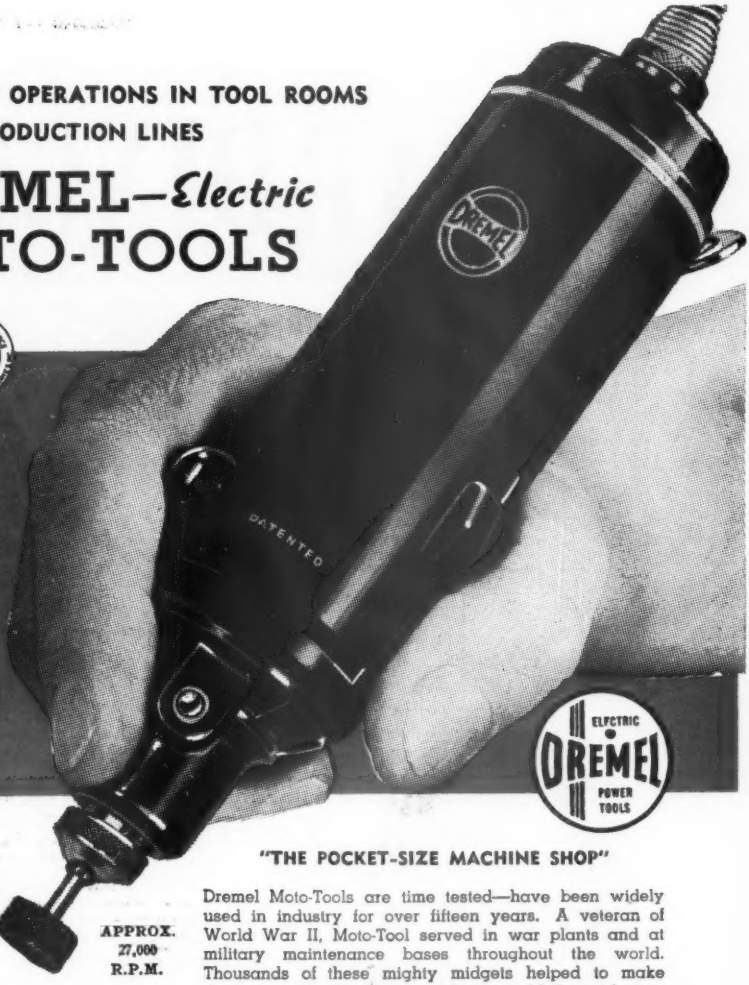
NOTE: Oversize - Undersize - Acme - Metric - 64th 32nd Size Taps - Available for Quick Delivery

• Are you on our monthly mailing list? Write us today!

SID TOOL COMPANY, INC.
CUTTING TOOL SPECIALISTS
126 LAFAYETTE STREET • NEW YORK 13, N. Y.
PHONE: BE 3-4270

SPEEDS UP OPERATIONS IN TOOL ROOMS
. . . ON PRODUCTION LINES

DREMEL—*Electric* MOTO-TOOLS



DOES THESE OPERATIONS BETTER-FASTER:

GRINDING
DRILLING
BURRING
POLISHING
DRESSING
SHARPENING
ENGRAVING
FINISHING

ELECTRIC DREMEL POWER TOOLS

WRITE FOR INDUSTRIAL CATALOG

APPROX. 27,000 R.P.M.

"THE POCKET-SIZE MACHINE SHOP"

Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty midgets helped to make the atomic bomb—were used to establish production records in defense industries during the last war. Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, **without tearing down "set-ups."** Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibration-less operation.

MOTO-TOOL KIT NO. 2 contains 23 accessories, including **high-speed steel cutters** and Model 2 Moto-Tool in natural finish hardwood case $23.50

MOTO-TOOL No. 2, with one emery wheel point $16.50

Dremel HIGH-SPEED STEEL CUTTERS and balanced wheel points are available for all makes of hand grinding tools. Write for literature.

DREMEL MFG. CO. Dept. 522-G RACINE, WIS. U.S.A.

HARDINGE

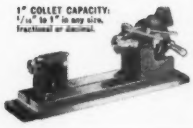
HARDINGE
ELMIRA, N.Y.

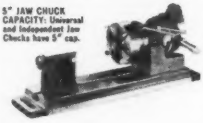
COLLET INDEX FIXTURES

Speed Production and Hold Work Accurately

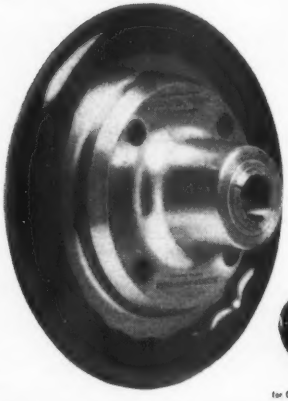
This fixture will take both step chucks and jaw chucks in addition to standard collets; your tool room will not have to make special fixtures.

A Preselector Index Plate makes possible the separate indexing of any number divisible into 20 or 24. Quick opening and closing of collets and step chuck, with 100 to 1 closer lever.





For full information write for Bulletin CIF.

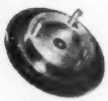


HARDINGE-SJOGREN

SPEED COLLET CHUCKS—*Fast and Accurate*

The Hardinge-Sjogren Speed Collet Chuck gives greater capacity, saves time, insures accuracy and better results. It is readily adapted for use on all tool room and engine lathes. Keys and wrenches eliminated . . . a turn of the handwheel automatically opens or closes the collet, releasing or locking the work as desired. Its grip is adjustable and sure. No waste motion . . . the operator is always in front of his work, production increased.

Available in 1", 1⅜", 2¼", 3½" collet capacity. Write for Bulletin 8.


for CAM-LOCK SPINDLES

for Tapered KEY-DRIVE SPINDLES

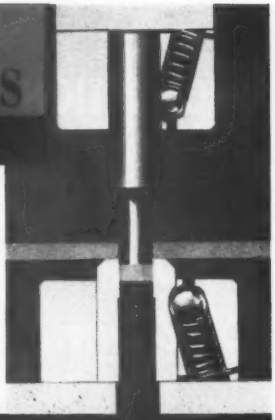
for THREADED NOSE SPINDLES

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

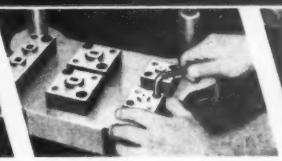
You Save Time with R-B PUNCHES and DIES

How They Work

R-B punches and die buttons are locked in standard or special retainers which are mounted on the die shoes. A spring-loaded ball lock produces positive radial alignment and vertical locking; *no additional keying is necessary regardless of the size or shape of the punch.* Up to ¾" stock can be pierced. R-B punches and dies are easy to insert; push and twist and they're locked. They're easily removed, too. Retainer holes provide for insertion of tanged tool which releases ball and allows instant removal.



How They Save Time



IN DIE DESIGNING

R-B standardized retainers are available in three shapes and many sizes, and where necessary, R-B special retainers can be supplied. You save "time on the board" because you are working with *standardized* equipment.

IN DIE CONSTRUCTION

R-B punch and die retainers and special retainers are quickly, easily and accurately mounted without special machining. With them, you can save much of your skilled diemakers' time.

IN DIE OPERATION

HERE'S WHERE YOU *REALLY* SAVE. R-B punches and dies cut press down time for replacement to a minimum. They're instantly removed — quickly changed — yet accurately aligned when locked.

Tool standardization is the basis for efficient and economical production. With R-B you get the accepted standard of the sheet metal industry—in standard design features that save in engineering, die construction and operation.

● SEND FOR 52 PAGE R-B CATALOG

ALLIED PRODUCTS CORPORATION
RICHARD BROTHERS DIVISION
DEPT. 63 12635 BURT ROAD DETROIT 23, MICHIGAN

Also Produced in Allied's Four Plants . . . HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Hi-Speed rotary filing of metal pattern

When Patterns are Finished the Haskins Way

When you file and finish metal patterns with Haskins Flexible shaft equipment, you get the precision craftsmanship that assures quality production. Designed to speed pattern, die and mold finishing, Haskins HS-4 equipment—½ h.p.—has a six-speed, Timken-bearing countershaft that develops up to 7800 r.p.m. Available with bench, pedestal or overhead mounting. The Haskins complete line of machines and attachments gives you the right combination for all grinding, sanding, filing, or polishing operations. Write today for complete information. R. G. Haskins Co., 605 S. Washtenaw Avenue, Chicago 12, Ill.

Overhead Suspension

Bench Mounted...

Pedestal Mounted...

haskins
FLEXIBLE SHAFT EQUIPMENT

HASKINS

Logan 920
Quick Change Gear Screw Cutting
Lathe 11" Swing, 1" Collet
Capacity, 1⅜" Spindle Hole 24"
and 36" Between Centers

THE PICTURE OF VERSATILITY

A *Logan* LATHE

Accurate in Every Lathe Operation

With Logan Lathes you are ready for every type of lathe operation. Heavy cuts, tool room precision jobs, high speed production runs and large volume second operation work are all routine Logan assignments. Versatility is inherent in the Logan ball bearing spindle with its wide speed range and sustained accuracy; in the accurate, rugged overall construction of Logan Lathes; and in the full line of Logan Lathe attachments. 11" swing, 1" collet capacity and 1⅜" spindle hole are typical of the specifications which make these accurate Logans capable of handling a high percentage of any shop's lathe turning. Easy to set up, simple to operate, frugal with power and durable, Logan Lathes economize every way you use them. In fact, no other lathe of comparable specifications can match the Logan in economy.

WRITE FOR THE LOGAN LATHE AND SHAPER CATALOG

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.
4901 West Lawrence Avenue, Chicago 30, Illinois

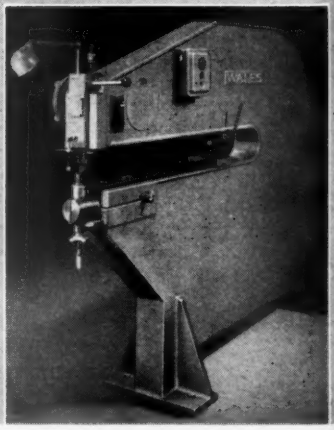
SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

WALES SHEET METAL FABRICATOR provides rapid interchangeability for punching and notching. Work from blueprints or operation sheets. *No templates required.* Write for Catalog 10-A.

WALES DRILLING MACHINE is specially designed to meet the exacting requirements of locating, drilling and reaming holes in material of practically any length and up to 36" wide. Write for Catalog DM.

WALES TWIN COLUMN PRESS features simplicity of the design that fulfills the engineering axiom "building it simple builds it better". In many cases, this press eliminates the necessity of a die set. Write for Catalog TC.

WALES TRU-EDGE CONTOUR SHEAR cuts and trims irregular shapes and circles and also beads, forms and flanges. Ideal for accurate, short run work eliminating prohibitive die costs.
Send for Catalog TS.



WHY THERE IS NO COMPROMISING WITH

WALES EQUIPMENT

● Wales expanded line of metal fabricating equipment provides a machine for practically all types of operations . . . punching, notching and nibbling . . . drilling and boring . . . blanking, forming, drawing and beading . . . and shearing.

Standardizing on this versatile Wales line assures the exact type of equipment for various operations. Depending on the number of parts and size and shape of the work, one piece of Wales Equipment is more efficient and economical than the other. To fully determine which Wales Machine is most applicable to your particular type of work, call on Wales Engineers who have had years of experience in the best ways to fabricate parts.

Yes, make it standard practice to call on Wales Engineers FIRST for their valuable time-saving, money-saving suggestions.

WALES-STRIPPIT CORPORATION
George F. Wales, *Chairman*
355 Payne Avenue, North Tonawanda, N. Y.
(Between Buffalo and Niagara Falls)
Wales-Strippit of Canada, Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment

SPEED PRODUCTION ... and CUT COSTS!

Use SJ **SCULLY-JONES**
DRILL and TAP CHUCKS

Save costly set-up and down-time: *No moving parts to get out of order. Simple one-piece design. Easy to insert or eject. Broached square provides positive drive... eliminates slipping and tool damage. Collet action automatically centers tool. Ideal for close center and multiple spindle work.*

Reduce tool replacement: *Carefully hardened to resist nicking and burring, which often cause misalignment and tool damage. Bore and shank machined concentrically to assure true-running tools and reduce rejects. Built to withstand modern production methods and outlast many drills or taps.*

"STYLE A"
SCULLY-JONES TAP CHUCKS
Save costly "Set-Up" and "Down-Time". Drive tap by the square — center by the shank — hold with a collet action.

"STYLE B"
SCULLY-JONES DRILL CHUCKS
For driving straight shank drills. Make possible 25% or more saving. Easy to use. Positive drive; no slipping. Accurate drilling.

"STYLE B"
SCULLY-JONES TAP CHUCKS
Similar in design to "Style B" Drill Chucks. No moving parts to get out of order; require no adjustments.

"STYLE B"— SCULLY-JONES CENTER DRILL DRIVERS
For driving combined center drills and countersinks — regular and bell styles. Simple one-piece tools.

Send for Bulletin No. 1-50
on Scully-Jones Drill and Tap Chucks.

Scully-Jones AND COMPANY
1013 S. ROCKWELL ST., CHICAGO 9, ILLINOIS

YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

JIG GRINDING ACCURACY *guaranteed**

INFINITE CONTROLLED SPEEDS 30,000 TO 65,000 R. P. M.

Easily connect jig grinder to jig borer or mill

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

*Dependably accurate to "tenths"

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 8 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3 3/16" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.

Vulcanaire

BUILT BY TOOLMAKERS FOR TOOLMAKERS

VULCAN TOOL CO., • PRITZ STREET • DAYTON 10, OHIO

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

the HOT COLLET FOR HOT ROLLED STOCK!

SUTTON FULL FLOATING MASTER COLLETS

STYLE "F"

RUNS AS TRUE AS THE SPINDLE

Full bearing on Hot Rolled Stock!

The patented "Style F" master collet with easily changeable jaws is designed primarily for handling hot rolled stock. Each jaw floats independently, with the jaws coming to a full bearing on the stock, permitting the collet to run true.

Jaws are furnished with Sutton diamond serrations. With this full and angular gripping contact, it is necessary to chuck the work only two-thirds as tightly as with a standard collet. This advantage insures long life, reduces scrap, lowers the power demand, and provides reserve of gripping power.

Department TP-7 Sutton Tool Company, Sturgis, Michigan

SUTTON COLLETS

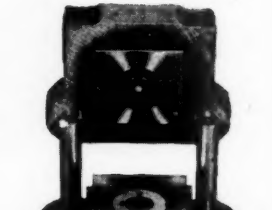
SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

A "MUST" wherever WASHERS are made!

HOVIS

OFFERS YOU THIS SIMPLE, UP-TO-THE-MINUTE METHOD

There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.



Made in 5 sizes:

¾"—1½"—2½"—4"—6"

Write for literature.

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD
Phone: Slocum 7-4800

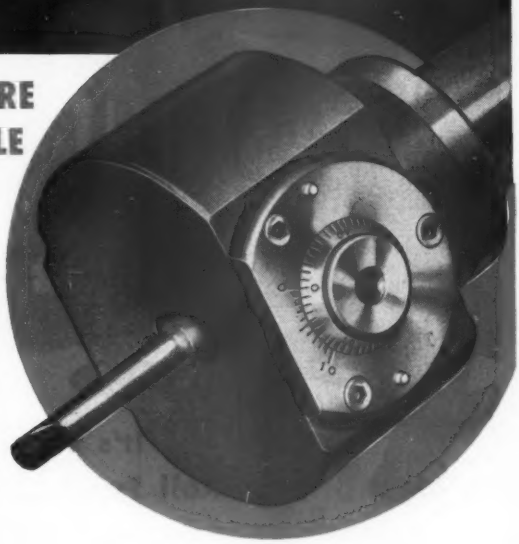
VAN DYKE, MICHIGAN
Suburb of Detroit

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

MICROBORE
by DeVLIEG

FOR PRECISION BORING

THE NEW MICROBORE MB-121 ADJUSTABLE BORING HEAD



This Boring Head is adjusted rapidly and accurately by means of proven micrometer Vernier arrangement. The tool slide can be adjusted in accurate increments from zero to ¼" off center. With a standard set of boring tools, bores ranging from ¼" to 1" diameter can be machined. The boring head can be furnished with straight, taper, or flanged type shanks to suit any make of boring machine.

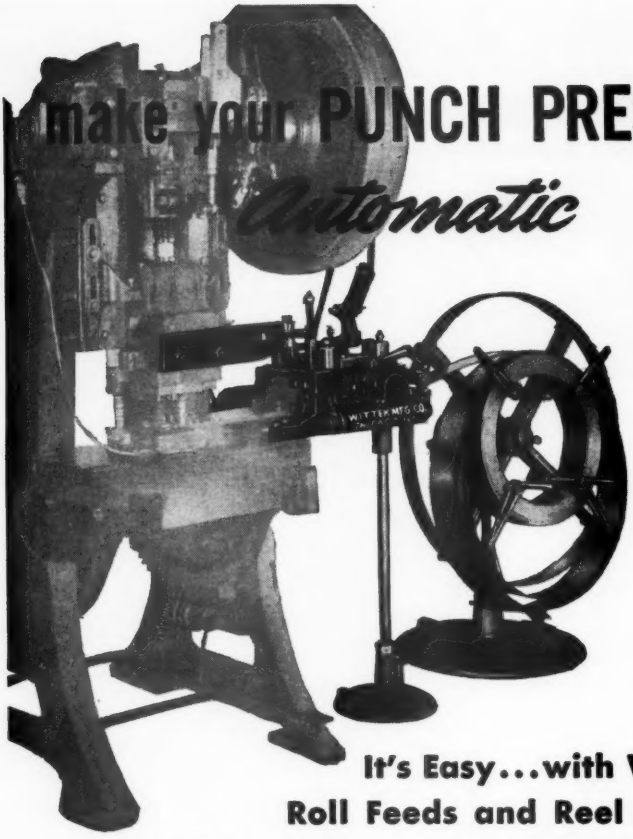
Manufacturers Representatives: A few desirable territories are open to qualified representatives. If interested please write for details.

Send For Illustrated Catalog

DeVLIEG MICROBORE COMPANY
480 Fair Avenue • Ferndale 20, Michigan, U.S.A.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

make your PUNCH PRESSES *Automatic*



It's Easy...with WITTEK Roll Feeds and Reel Stands

Wittek Roll Feeds handle any type of coiled strip stock and are made in single roll, double roll, and compound types with straighteners, in models to feed in any of four directions. They are reliable and accurate with simple, quick adjustment of feed length. Standard sizes and models meet a wide variety of press size and capacity conditions.

Wittek Reel Stands facilitate handling coiled stock.

Write for full particulars

WITTEK Manufacturing Co.

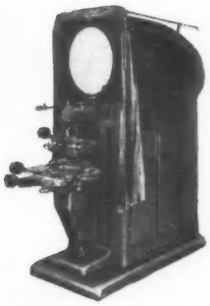
4323 W. 24th Place, Chicago 23, Illinois

Automatic ROLL FEEDS AND REEL STANDS

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

which of these 3 optical aids answers Your PRECISION PRODUCTION PROBLEM ?

1



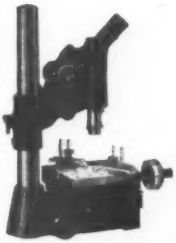
CONTOUR MEASURING PROJECTOR—You save time and money by spotting inaccuracies quickly and simply . . . with higher precision measurements than any other projector can give you. You get angular measurements to ± 1 minute of arc with a protractor screen, and direct linear measurements to ± .0001" over a range of 4" by 6" with the cross slide stage. Dimensions, angles and profiles of production-run parts can be compared directly with a *traced* outline of the projected image of the master part, or with a scale drawing superimposed on the screen. Write for Catalog D-27.

2

STEREOMICROSCOPES

The finest optical system ever produced for stereoscopic work assures you precision accuracy in small parts assembly operations and in inspection of tools and finished parts. You get clear, sharp, three-dimensional images, and a *wider critical focus than ever before.* The *unreversed,* magnified image is more easily interpreted by the average user. These sturdy, dustproof microscopes are extensively used in industry, either alone or incorporated into machine tools. Write for Catalog D-15.

3



TOOLMAKERS' MICROSCOPE

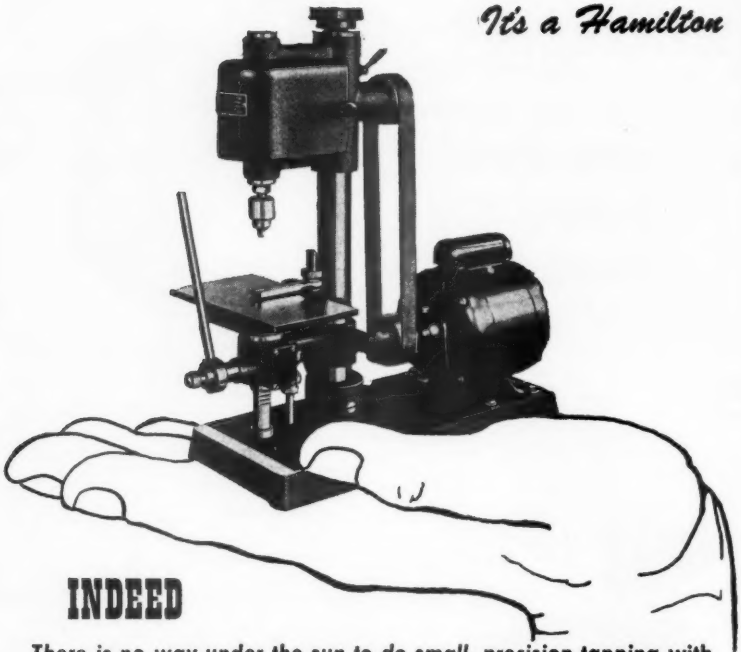
This sturdy microscope gives you one inch linear measurements to ±.0001" and angular measurements (with protractor eyepiece) to ± 1 minute of arc. Operation is extremely *simple* and *fast.* Opaque and transparent objects of any contour can be measured. Catalog D-22.

WRITE for complete information on these three important optical aids designed to save you time and money. You may be paying many times over their moderate cost in lost time and rejects. Bausch & Lomb Optical Co., 79807 St. Paul St., Rochester 2, N.Y.

B&L Bausch & Lomb *Quality Control* Instruments

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

It's a Hamilton



INDEED

There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE *IS SUCH A TOOL!*

The complete story of this machine is told in our Bulletin T-471. IT'S FREE. ASK FOR IT!

THE *Hamilton* TOOL COMPANY
1032 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

INCREASE PRODUCTION with Commander PRODUCTION TOOLS

Adjustable MULTI-DRILL

★ DRILLS UP TO 8 HOLES AT 1 STROKE
★ ADJUSTABLE TO *ANY* HOLE PATTERN
★ FITS *ANY* DRILL PRESS

You can drill 2 to 8 holes at one stroke of a MULTI-DRILL equipped drill press. Instantly and easily adjusted to any hole pattern . . . compact in design and ruggedly built for years of service, thousands of MULTI-DRILLS are cutting costs and increasing output up to 800% wherever metal, wood or plastics are drilled.

New DRILL CHIP BREAKER

Get these COMMANDER DRILL CHIP BREAKER benefits now:

- **Faster Drilling**
- **Deeper Holes**
- **Better Holes**
- **Longer Drill Life**
- **Safer, Cleaner Work**
- **REDUCED DRILLING COSTS**

ORDINARY CHIPS

CHIP BREAKER CHIPS

Write for illustrated Circulars on Commander Production Tools. Your nearby Commander Distributor carries the full line — write for his name.

COMMANDER TAPPER

★ 1 Tapper Handles Taps #0 to ¾"
★ Automatically Sensitive... Any Operator Can Do Precision Tapping
★ Fits ANY Drill Press

Commander Tappers "think for the operator"—automatically stop when taps are dull, overloaded, or when they strike bottom in blind hole tapping —permit faster tapping, better work, even with inexperienced operators. Torque control provides positive tap protection from #0 to ¾"...spring clutch eliminates slippage, assures smooth, quiet, easy operation.

Commander MANUFACTURING CO.
4228 W. KINZIE ST. • CHICAGO 24, ILL.

For more

you have a wide

NORTON

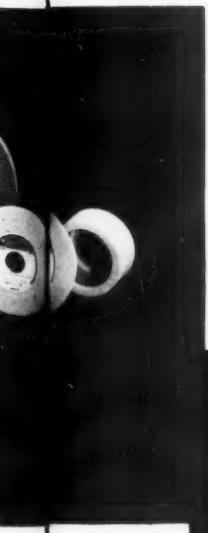
ABRASIVES

Making better products to make other products better

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

efficient surface grinding at lower cost

choice of *Norton wheels, cylinders, segments*



Choose Norton ALUNDUM* abrasives for surface grinding high-speed steels, #400 series stainless steels, carbon steels, alloy steels, annealed malleable iron and the tough bronzes. There are five types of ALUNDUM abrasives available — 19 ALUNDUM, the revolutionary 32 ALUNDUM, 38 ALUNDUM, 57 ALUNDUM and Regular ALUNDUM. First choice in solid wheels or segments, particularly where rapid stock removal is an important factor, is 32 ALUNDUM abrasive which has the unique property of a nubbly grain shape and exceptional point endurance.

Choose Norton CRYSTOLON* abrasives for surface grinding hard cast iron, chilled iron, #300 series stainless steel, brass, soft bronzes, aluminum, rubber, and hard facing alloys. The first choice for grinding all of these materials is hard, sharp 37 CRYSTOLON abrasive.

Norton Bonds for surface grinding include vitrified, silicate and resinoid. For use with the ALUNDUM abrasives, Norton Research has developed a special vitrified bond known as "BE"

NORTON COMPANY, Worcester 6, Mass. Warehouses in 5 cities. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Step up your production with this Norton chuck and segments

Use on vertical spindle surface grinders where contact is broad. Replace the cylinder wheel with a Norton chuck and segments. Can be mounted without machine alterations. Segments can be changed or adjusted without removing chuck. Gives faster cutting action — lower rate of wear.

See Your Norton Distributor

For the *right* abrasive, the *right* bond, the *right* structure for your surface grinding jobs, see your Norton Distributor. He will be glad to show you how to get the best results in grinding, consulting directly with a Norton Abrasive Engineer should additional advice be necessary. Ask him, too, for your copy of the brand new Booklet 7632, "The ABC of Surface Grinding" — or write us direct. Contains 88 fact-filled pages of helpful information.

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Announcing

America's Finest
HARIG Tools & Dies
Precision Craftsmanship

A new HARIG PLANT with modern precision equipment to SERVE YOU BETTER

HARIG makes America's finest

- CARBIDE DIES
- LAMINATION DIES
- PROGRESSIVE DIES
- BLANKING DIES
- DRAW DIES
- MOLDINGS DIES
- JIGS and FIXTURES
- PERFORATOR GRINDING ATTACHMENT
- SPECIALTY MACHINES

HARIG

MANUFACTURING CORPORATION
5761 West Howard Street, Chicago 31, Ill.

THE NEW No. 4 AUTOMATIC SCREW MACHINE

Capacity — takes stock to 1½" dia., or where work permits, round stock to 2" dia. (to 2⅜", with outside feed) and hex stock to 1¾" across flats.

Spindle Speed Range — 168 two-speed combinations from 17 to 1965 R.P.M. in ratios from 2.2: 1 to 13: 1.

. . . for low-cost, medium-sized work

Modern in design, massive in construction, the New No. 4 Brown & Sharpe Automatic Screw Machine shortens set-up and operating time . . . assures continuous, accurate production of medium-sized parts. It makes possible highest cutting efficiency on a wide variety of materials and work diameters. Important features include:

Anti-friction Bearing Spindle — chain drive . . . delivers full power at all speeds.

Vertical Slide — provides additional tool slide.

Flat-faced Turret — tools bolt directly to face . . . firmer support for heavy cuts.

Automatic Accelerating Mechanism — speeds up camshaft for idle portion of cam contour.

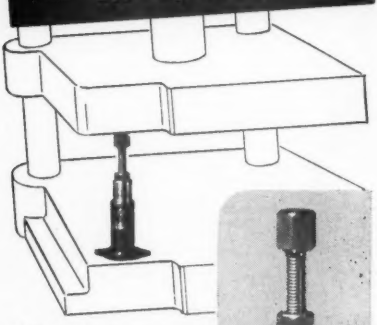
Simplified Stock Loading — new bar introduced quickly, easily.

Write for complete catalog and specifications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

Brown & Sharpe B·S

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

The KE-VO—Revolutionary Die Depth Gage!



Now! You can accurately adjust the depth to which a punch (or punches) will enter a die . . . re-adjust to new depths when the die is ground—within seconds, with only a few twists of the wrist!

Protect *all* your blanking, forming and drawing dies against damage due to over-striking or handling . . . increase their working life . . . slash die set-up time . . . and cut scrappage to a minimum — with the KE-VO Die Depth Gage! Permanently mounted on the die shoe, KE-VO adjusts in a jiffy to $4\frac{1}{2}$" high, $2\frac{9}{16}$" low. Unique design permits locking gage out of striking position when in production.

Only **$2.25** plus postage

Order several KE-VO's for *all* your dies TODAY! Hundreds in use *prove* their value!

VOCAR MFG. & SALES
BOX 97, PROSPECT HTS., ILLINOIS

EDITORIAL INDEX

Editorial 41

Die Design

"Die Design for Metal Blanking" by R. C. Berliner, C. D. Cash Manufacturing Co. 46
The design of blanking dies is divided basically into three types: temporary type, permanent progressive type and permanent compound type.

Machining High Temperature Alloys

"The Machining of High Temperature Alloys" (Part 2), by D. C. Goldberg and P. G. Dr Huff, Westinghouse Electric Corp. 50
Capacity and rigidity of the machine tool, accessory tooling, feeds and speeds, and coolants are discussed in this final installment.

Screw Machine Production

"The Free Cutting Copper Base Alloys" (Part 2) by Lester F. Spencer, Landers, Frary & Clark 52
Mr. Spencer continues his analysis of the machinability of copper base alloys and the type of tools for best results.

Rubber Pad Metal Forming

"Marform Metal Forming Procedures" 58
This new technique extends the drawing possibilities of rubber pad forming by combining the best features of the steel die and the Guerin process.

Production Control

"Carborundum Applies Nuclear Physics to Production Control" 60
A radically new production technique controls thickness and density of adhesive, abrasive, and final adhesive coat in the manufacture of coated abrasives.

Short Run Stamping

"Pressed Metal Institute, Third Spring Technical Meeting .....
The different methods in use for tooling for short run stamping were the panel discussion topics at this technical meeting.

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

—shorts—

Men You Should Know 100
Metal Specifications for Ceramic Coating 108
Chrysler Scrap Drive Rounds Up Vital Metal 131
Carbide Shearing Die Inserts Trim Six Surfaces on a Steel Casting 132
Just a Few Points on Tool Design 134
Portable Unloader Facilitates Unloading Small Parts 135
U. S. S. Nautilus to be Powered by Westinghouse Atomic Engine 136
Milling Machine for Weight Balancing of Connecting Rods 138
Bliss Revises Manual of Press-Work Computations 140
Die Casting Accelerated with Improved Machines 142
Improved Hardfacing for Solenoid Anvils 144
Color Coding for Inspection Trays 144
New Inspection Set-up Saves Many Hours on Big Welding Jobs 146
Radioactivity Tests Tool Life 149
Die Set Gives Long Accurate Performance 154
Powder Metallurgy In Lionel Trains 158
Inclined Fixture Spots Diesel A-Frame for Safe and Easy Welding 160
New Tube Bender Features Versatile Operating Circuit 162
RCA Assembly Problem Solved 164
Knitting Machine Bobbing Mechanism Powered by Flexible Shaft Drive 164
Electronic Clutch Featured on New Power Press 166
Multi-Operation Broaching 168
Serrated Edge Abrasive Belt Speeds Jet Blade Production 168
Reworked Tools Get New Life at Chrysler 170

—departments—

"SHOP AIDS" 104
We've briefed the content of these catalogs to save you time in getting information on your requirements.

"PUBLICATION PREVIEWS" 112
Here's a wealth of information, but too much to carry in your head.

"QUICK-PIC CATALOGS" 156
Here we've practically put some of today's newest literature up on a rack ready for you to take your pick.

"PROGRESS ON PARADE" 172
Each and every one of these new machines, tools and accessories is capable of saving money or increasing productivity.

It will be to your advantage to be familiar with the improved

LECTROETCH

INSPECTION *Marking* SYSTEM for applying process and final inspection symbols to metal tools, parts and gages.

SIMPLIFIED REPETITIVE MARKING of METAL PARTS with *new* Miniature Hand Pads.

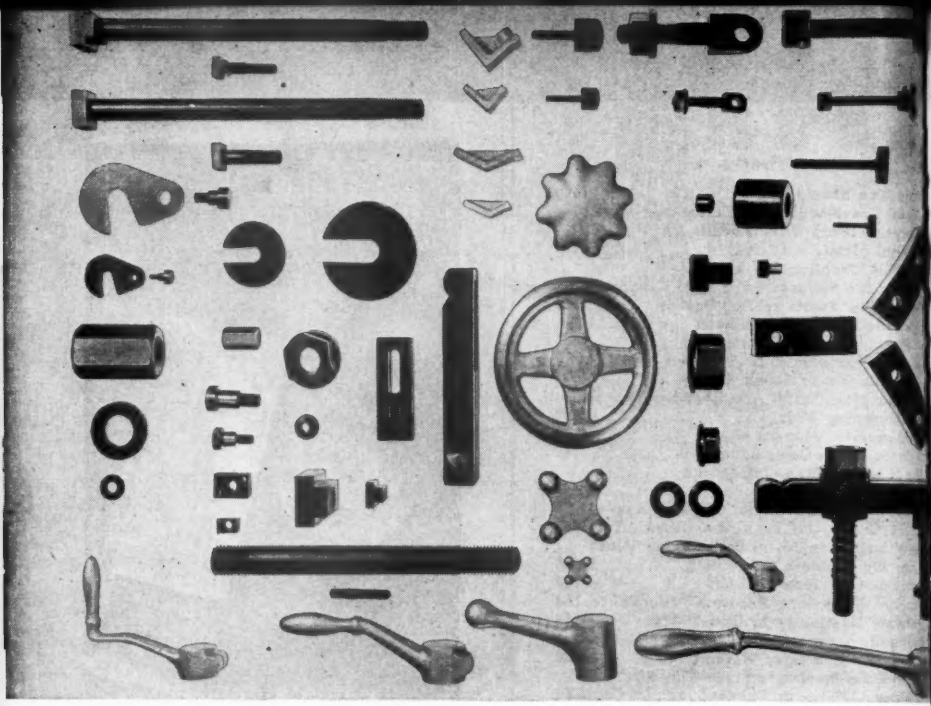
BETTER STENCILS for emergency and production marking.

Write for Bulletin or CALL US for a demonstration in your plant.

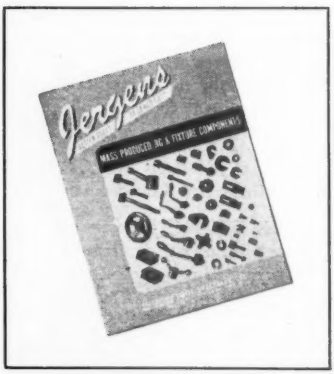
PHONE: GLenville 1-8080

The LECTROETCH Co.
14925 Elderwood Ave. East Cleveland 12, Ohio

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS



ECONOMIZE WITH JERGENS MASS-PRODUCED COMPONENTS



Yes, economize in man hours—save skilled tool room personnel—valuable time of designers, increase production and save up to two-thirds the cost using Jergens Mass-Produced Components as standard in your plant.

The Jergens' line of standards is one of the most complete lines of its kind in production today. There is no compromise on quality. Each item is precision made of heat-treated alloy steel with anti-rust black penetrate finish. Jergens' Standards hold-up in the toughest applications usually outlasting the jigs and fixtures on which they are used.

There's over 375 Jergens' fixture parts plus strap clamp assemblies—chuck jaw blanks and the cast aluminum line of hand wheels, levers and knobs.

Write today for Jergens' New Folder TP-7.

Jergens TOOL SPECIALTY CO.

712 E. 163rd ST. . . CLEVELAND 10, OHIO

editorial

tax anesthesia

Did you read the startling article in the June 1952, *Reader's Digest*, entitled "Deceptive Taxation"? As this reader digested the article it pointed up, drastically, that by far the most of us are living in a state of tax anesthesia. To a great extent we are unconscious of the magnitude, to say nothing of the identity, of the multitude of taxes which we pay daily.

The insidious thing about them, and which is making them a creeping paralysis of our enterprise and economy, is that they are so hidden that we don't recognize them for what they are. They enter into every transaction that is essential to our daily living.

We are too used to thinking that the federal income tax is the biggest bite taken out of our earnings.

"Deceptive Taxation" demonstrates that for a goodly sampling of family income levels, the federal income tax represents only 27% to 39% of the family tax burden. The balance is made up of hidden taxes.

For most of us, the federal income tax is paid by withholding from wages on salaries. Maybe, after this "painless extraction" there's enough "take home" to permit a new car. So we take on one of today's less expensive cars for $2000.

How many of us realize that in doing so we ante more than $600 to federal, state and local tax collections? In other words, due to taxes we pay $2000 for a $1400 car!

"Deceptive Taxation" points out that a tax burden of 25 cents on the average citizen's dollar is about as far as the government can safely go. Beyond this, taxes cause inflation and destroy incentive; the flow of venture capital into new plants, equipment and products vanishes. America's industries are built upon, and their future growth depends upon, our people's willingness and ability to risk their cash

If our crippling tax burden results in jeopardizing industry's future growth and development, the United States is in real danger of biting off its nose to spite its face.

Today, we are being taxed an average of 32 cents on the dollar. This is seven cents, or 28%, higher than the safety valve is set for!

Come November 4th, 1952, we average citizens are pretty important people. For those few hours while we are casting our ballots we are in the saddle. The politicians woo us and the tax spenders fear us. Depending on how we vote, when the noses are counted we will have given either the green light or the red light to those who collect and distribute our tax dollars.

"Deceptive Taxation" should be given the widest possible distribution by service clubs, veterans' organizations, parent's and teacher's associations, labor unions and employers for study and action by their groups. It is conceivable that a copy of "Deceptive Taxation" enclosed in every pay envelope right across the country could spark the job of lessening our tax burden and stimulating governmental economy that so desperately needs doing.

Reprints of "Deceptive Taxation" are available at a moderate cost. Prices, postpaid to one address: 10—30 cents; 50—$1.25; 100—$2.00; 500—$9.00; 1000—$14.00. Order them from Reprint Editor, *Reader's Digest*, Pleasantville, N. Y.

We have a few and if you would like a single copy we will be glad to send you one.

E. Willard Pennington

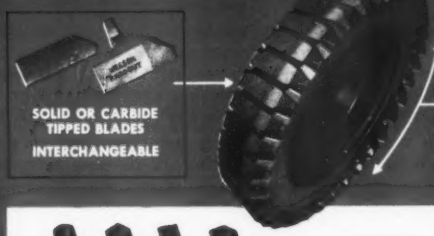
editor

PIONEERS IN THE ART OF DESIGNING AND PRODUCING CEMENTED CARBIDE TOOLS

IS YOUR TIME RUNNING OUT ?

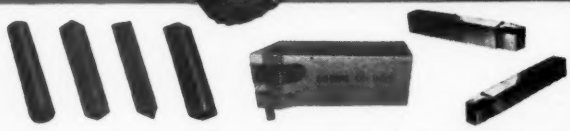
Do MORE METAL WORKING in Less Time

with WESSON TOOLS and WESSONMETAL



SOLID OR CARBIDE TIPPED BLADES INTERCHANGEABLE

FINER PITCH MEANS MORE BLADES, LESS SHOCK LESS CHIP LOAD



WESSON TOOLS are designed to take full advantage of solid carbide. Wesson Holders—the multicut, lathe tool, the Rigidcut face mill and other Wesson tools give you more production for less money.

WESSONMETAL produced in uniform standard grades and several special grades, is fast becoming the leading cemented carbide. Write today for complete information on Wessonmetal and Wesson Tools.

WESSON COMPANY Affiliated with WESSON METAL CORPORATION

1220 WOODWARD HEIGHTS BLVD. • FERNDALE (DETROIT 20), MICH.

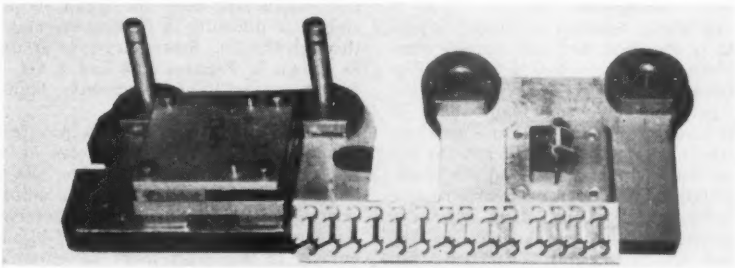


Fig. 1. Temporary blanking die mounted on standard die set.

Die Design for Metal Blanking*

by R. C. Berliner
President
C. D. CASH MANUFACTURING CO.
Chicago, Illinois

The blanking dies that we will discuss at this time are basically divided into the following classes:

(1) Temporary-type or quick-process blanking type.

(2) Permanent blanking dies of the progressive type.

(3) Permanent blanking dies of the compound type.

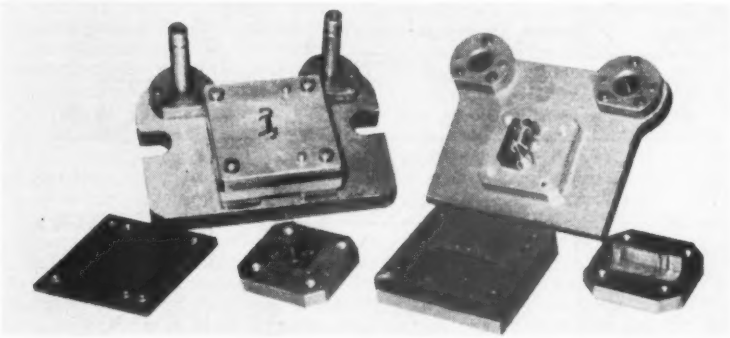
Temporary Type Blanking Dies

are used for short-run production jobs. Since a low die cost is essential for this type of die, they should be made with a minimum of material, omitting many of the finer details which are contained in a permanent type die.

Usually only the die block, blank punch and a means of stripping are provided for, and the die is run either in a standard die set as shown in Figure 1, or is mounted in the punch press or screw press, using the push-through method which will be explained later.

*From the 20th Annual meeting of the American Society of Tool Engineers. Presented here through courtesy of the Society. Ed.

Fig. 2. Same die as shown in Figure 1, with interchangeable punches and die blocks.

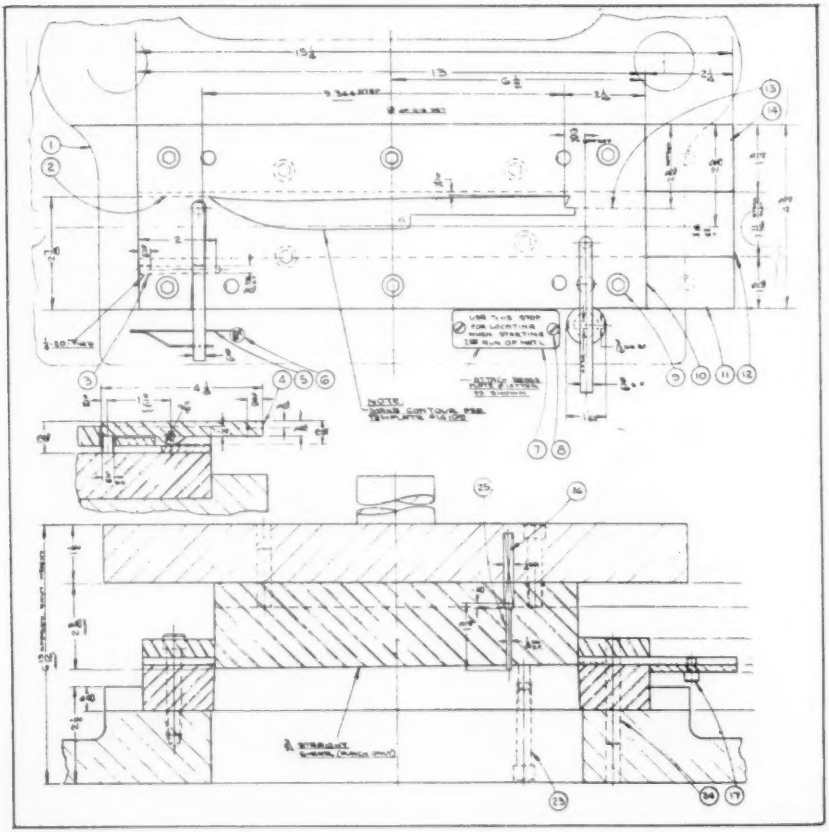


Permanent Blanking Dies of the Progressive Type are used where medium or long-run production is required, and are usually combined with other operations, such as piercing, stamping, and embossing. In blanking parts progressively, the blank part is pushed through the die block and die shoe, while the material is fed through the die between the stripper plate and die block.

The stripper plate used on progressive dies can be either a stationary type or a spring-type stripper, dependent on the thickness of the material. When thin parts are being blanked (approximately 0.015 to 0.020 in. or lighter) it is advisable to provide the die with a spring-type stripper, which will keep the scrap strip flat and avoid difficulty in feeding the material through the die. Stationary-type strippers as shown in Figures 2, 3 and 4 are used in the majority of progressive blanking dies.

If the part produced in a progressive blanking die contains any holes or slots that are near the blanked edge, the part itself may have a slight dish or deformation which is caused by the difference in the direction of the piercing and blanking burrs. If this dish must be eliminated, harder stock must be used or the part be flattened afterwards.

Fig. 3. Progressive die for blanking knife blade.



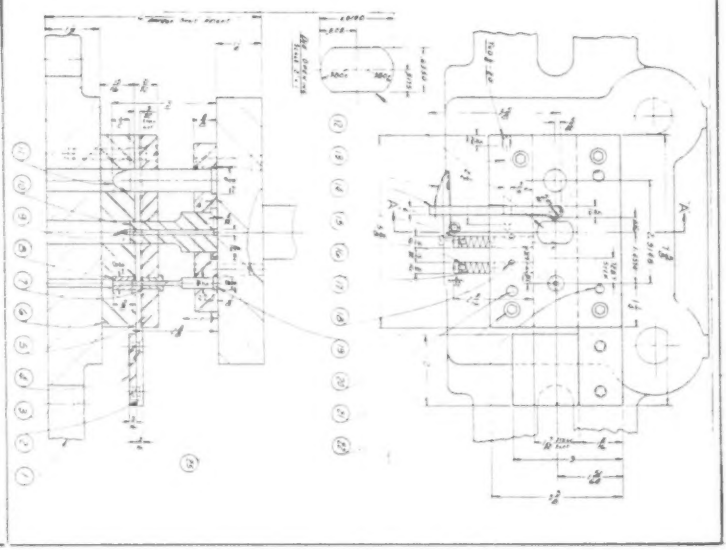


Fig. 4. Progressive die for blanking a plate.

The above described condition is very noticeable in the case of washers which are made progressively. Another means of eliminating distortion in pierced and blanked parts is to make them in a compound type blanking die.

Permanent Blanking Dies of the Compound Type

are used where a flat blank is desired, and a definite relation between the holes in the part and the outside contour must be maintained accurately. The compound die, also called an inverted die, differs in construction from the progressive type die in that the die block is mounted to the punch holder and the blank punch is mounted to the die shoe as shown in Figures 6 and 7.

In blanking parts in a compound die, the burr of the pierced hole is on the same side as the burr of the blanked contour, and since both enter from the same direction against the flat blank punch, the part produced is flat and concentric. In contrast, in the progressive die, the burr of the pierced holes is on the opposite side from the burr of the blank contour.

One of the advantages of compound dies which is often overlooked is that multiple operations are produced in the same station, thus decreasing the die size considerably. For example, if the die shown in Figure 7 were made progressively, the die would be almost twice as long. Also, serious consideration would have to be given to clearing the blanked part through the die, bolster plate and the bed of the press; whereas, in the compound die the blank does not go through the die.

Referring back to the temporary-type blanking die, the simplest die of this type is known as the push-thru type, where the punch is placed loose in the stripper opening and is pushed through the material being blanked, and then through the die block. The punch is struck by a flat block or plain punch holder which is mounted to the ram of the punch press. The number of pieces produced by this method is limited only by the slowness of the operation.

For blanking parts up to 3/32 or ⅛-in. thick, ⅜ or ½-in. thick flat ground gage stock can be used for the die block and approximately the same for the blanking

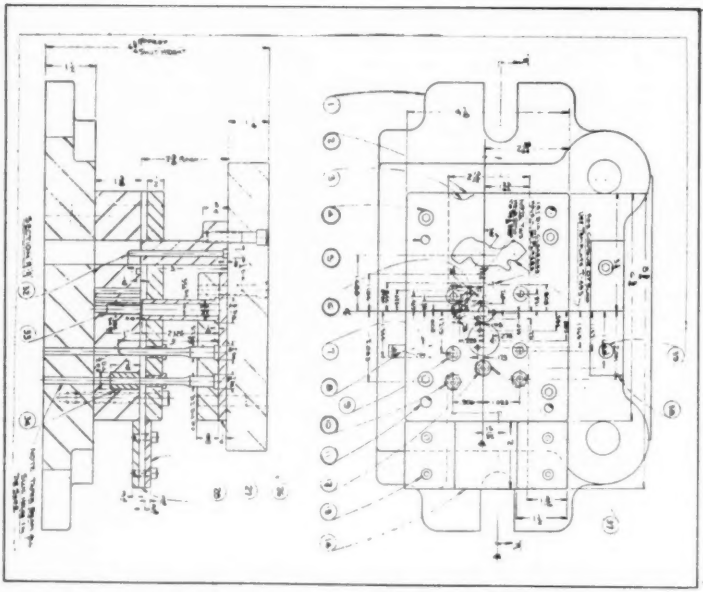


Fig. 5. Progressive pierce-emboss-blank die for can opener blade.

punch. For lighter material, a ¼-in. thick die block is adequate.

In cases where a limited number of pieces must be made, and there is a possibility of short re-runs, the same die above can be mounted on to a standard die set.

In our shop we use standard die sets for various short-run parts, which are similar in size to those shown in Figures 1 and 2. We have found that dies of this type can be made for about 50% of the cost of the regular permanent-type blanking die. By standardizing the mounting holes, and mounting the die blocks on rails so that the blanks do not have to go through the die shoe, the need for cutting out the die shoe for special shaped parts is eliminated.

When blanking heavier parts using the rails as shown in the illustration, caution must be taken that the weaker sections be supported with buttons to minimize the danger of cracking the thin die block. Also, provision must be made that the blanks can be pushed out freely and often, as the rail gap does not usually have room for more than a dozen blanks, depending on the material thickness being blanked. Another way of strengthening the thin die block is to add a thick cold-rolled steel filler block on a standardized punch pad as shown in the photographs.

The temporary dies shown in Figures 1 and 2 are built along the progressive die principle, but are not adaptable to long or high-production runs.

Figure 3 is a typical illustration of a progressive blanking die for a knife blade. This die was made for a high-production run and the material being blanked is 0.070-in. thick stainless steel. The die block and blanking punch are made of high-carbon, high-chrome tool steel and were hardened to Rockwell "C" 60-62.

The die block was made in two sections and was sunk into the die shoe to prevent spreading. The blanking punch is flange-mounted directly to the punch holder, and has 3/32-in. straight shear on the cutting edge to reduce the blanking pressure.

Since the stainless steel being run is quite expensive, the die was laid out for a double run of the material with the most economical layout possible. The die has an automatic finger stop, and a second

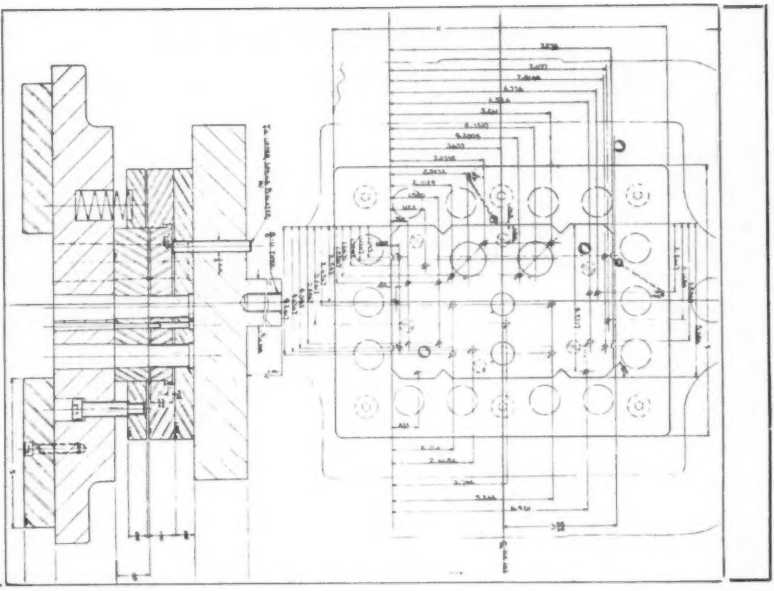


Fig. 6. Compound blank and pierce die for a housing.

stop which is used to start the strip through the die on the second run of the material.

In Figure 4 is shown a progressive pierce and blank die for a small plate. This die is constructed for high-production runs and is made of high-chrome, high-carbon steel. Since this die had a small pilot in the blanking punch, it was found necessary to add the auxiliary pilot which is shown at the left in the section view. This pilot picks up the blank contour after the part has been blanked out and locates the strip approximately in position, taking the strain of pulling the heavy strip off the small pilot that is shown in the blanking punch. The blanking punch in this case is mounted into the punch pad and has an auxiliary key to insure alignment with the die.

Figure 5 is another high-production progressive, pierce, emboss and blank die for a can opener blade, made of 0.050-in. thick, high-carbon steel. This die was made for a maximum production run of 15 to 20 million pieces. All piercing stations in the die block and stripper are provided with bushings for alignment and replacement.

The pierce and emboss stations are backed up with a hardened back plate and the blanking punch is flange-mounted directly to the punch holder. The blank contour was made from a developed template.

It should be noted that this die does not have any finger or automatic finger stops other than a single stop (detail 7) for starting the strip through the die. This die is being run using coil stock at approximately 6,000 pieces per hour.

Figure 6 shows a compound blank and pierce die for a housing which is made of 0.050-in. thick cold-rolled steel. The die block as shown was of a four-piece sectional construction which was keyed and cross screwed together. By using the sectional construction we were able to effect a savings in material and also were able to grind the blank contour to size after hardening.

The 90° notching sections in the die block were made solid with the thought in mind that should the sharp points break

(Continued on page 92)

The Machining of High Temperature Alloys*

(Continued) *

by D. C. Goldberg
and
P. G. De Huff
WESTINGHOUSE ELECTRIC CORPORATION
Aviation Gas Turbine Division

Capacity and Rigidity of the Machine Tool

It has been mentioned that these high temperature alloys are considerably tougher to machine than AISI or 347. On a machinability index*, the former is rated at 35 per cent. Inconel X on a similar scale would be about 5-10 per cent and Discaloy 20 per cent. This means considerably more power is required to machine a part from Inconel X than from one of the stainless steels.

Most of the engine lathes used in roughing operations are powered with a 20-hp

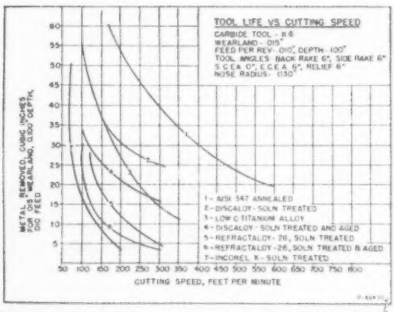

TOOL LIFE VS CUTTING SPEED
CARBIDE TOOL - K-6
WEARLAND - .015"
FEED PER REV. - .010", DEPTH - .100"
TOOL ANGLES: BACK RAKE 6°, SIDE RAKE 6°
S.C.E.A. 0°, E.C.E.A. 6°, RELIEF 6°
NOSE RADIUS - .030"
1 - AISI 347 ANNEALED
2 - DISCALOY - SOLN TREATED
3 - LOW C TITANIUM ALLOY
4 - DISCALOY - SOLN TREATED AND AGED
5 - REFRACTALOY - 70, SOLN TREATED
6 - REFRACTALOY - 26, SOLN TREATED & AGED
7 - INCONEL X - SOLN TREATED
METAL REMOVED, CUBIC INCHES PER MIN. PER .100 DEPTH, .010 FEED
CUTTING SPEED, FEET PER MINUTE

Fig. 6. Tool Life vs. cutting Speed for Five Alloys.

motor. Roughing out discs on such a lathe taxes the equipment to a maximum.

If the operations are performed on vertical turret lathes, which are equipped with 30-hp motors, conditions improve considerably. Heavier cuts can be taken at optimum speeds. It is felt that 50-hp motors will soon be needed on lathes and boring mills if they are to be able to rough out discs and housings in the quantities and at the speeds which are needed.

An additional consideration which is of vital importance is the factor of ever increasing diameter of the parts. In the near future a majority of the engine lathes will not be usable for compressor disc work. Lathes with a 60-inch swing will be required. In finish turning, the need for heavy duty lathes is absent. Lathes with hardened bearings, and special variable speed motors with shaved and hardened gears must be used. Many manufacturers are now making T-bed lathes to fullfill this requirement. Volume will be needed to do the job that is being planned.

For best results, lathes which are designated for fast roughing should not be used for the precise finishing operations.

Accessory Tooling

Figure 6 shows that the optimum machining characteristics of these alloys are limited to a fairly narrow surface-speed range. This problem becomes critical when one considers that in the turning of a disc with a diameter of 30 inches the surface speed can vary considerably. Today, most machine tools do not have enough versatility in the low speed range of 15- to 50-rpm that is required to maintain a uniform surface-speed across the surface of a disc. The answer would be the use of variable speed drives incorporated into the machine tools.

Contour machining of discs is difficult when done by hand feeding. It need not be so if there is incorporated a means for having the operation controlled from a master tracing. Many automatic feeding heads are available today such as cams, templates, magnetic wire, punched tape, and others. All have merits. It would be well for us in the jet-engine

*(See page 72, TOOLING and PRODUCTION, May, 1952)

*A paper presented at the 16th Annual Machine Tool Electrification Forum, sponsored by Westinghouse Electric Corporation, Pittsburgh, Pa., April 1 and 2, 1952.

*The machinability index is a rating of the ease of turning a material when compared to B1112 steel.

industry if the machine tool industry would establish their most promising design and start producing in volume.

Now that we have made our machines more and more automatic, we have a problem to consider which is overlooked too frequently—how do we dispose of the chips automatically. These automatic machines lose much of their value when the chips are allowed to accumulate.

Faster and more rigid methods of clamping are needed to accompany the trend of automation in tooling. Clamping is the stepchild of the industry. It is not unusual to see a fully automatic tool with hand-clamping devices.

Feeds and Speeds

Figure 6 shows the effect of varying cutting speed on tool life for five different alloys. In this work a cast iron horsepower motors.

These data also confirm the need for the variable speed motor so that continuous advantage can be taken of the optimum machining characteristic of the alloy being used.

Surface finish is dependent upon feed and speed as in all finishing operations. It is accentuated in the high temperature alloys due to their work hardening characteristics. If these parts are finish-machined in the hardened condition, this factor diminishes in importance.

Coolants

Every shop has its favorite coolant and it changes almost every month in its popularity. It is axiomatic that if the action of the coolant is to be of value it has to be available at the cutting edge at the instant of cutting. This type of

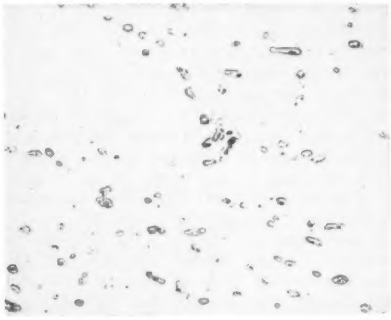


Fig. 7 left and Fig. 8 right, show the effect of carbon content on the Miscrostructure of 1.0 per cent Fe, 2.5 per cent CR Titanium Alloy.

cutting grade of carbide was used in conjunction with a 0.010 feed and a 0.100 depth of cut. Remembering that AISI 347 has a machinability index rating of 50 per cent, it is not difficult to recognize the problems encountered in machining these alloys.

Of particular significance is the steep climb in volume of metal removed at the lower range of speeds. Although not shown in Figure 6, volume factor increases rapidly with increasing feed and depth of cut. Advantage cannot be taken of this unless the machine tool builder constructs a more rigid machine powered with higher

thinking has led to the application of carbon dioxide and of the Gulf Hi-Jet process.

Carbon dioxide is only a coolant whereas in the latter process it is possible to have a chemical reaction at the tool tip-work piece interface to form a soft ionic chloride crystal on the tool to act as a lubricant. That this happens has been proven by the use of carbon tetrachloride as a coolant. It has no lubricity, but it does furnish chloride ions to the tool tip.

By the intelligent use of coolants, a machining job can be aided. However, too

(Continued on page 72)

Screw Machine Tooling is one answer when "innumerable parts are machined into complex shapes". Here is a wealth of screw machine experience with the

Free Cutting Copper Base Alloys

(Continued) *

by **Lester F. Spencer**
Chief Metallurgist
LANDERS FRARY & CLARK
New Britain, Conn.

The box tool is the most extensively used of all screw machine tools, as they can be employed on all varieties of straight turning, either roughing or finishing, and will turn one, two or three diameters simultaneously. They offer the advantages [9] of (1) adjustments over a wide range of diameters; (2) two or three tools for turning different diameters, facing shoulders or pointing the work; and, (3) offer support in turning slender work. For leaded low copper alloys, the face of the tool should be ground parallel with the axis; the blades be clamped rigidly in its holder and tangential to the diameter turned; and the back rests or supports should be carefully adjusted to the work so as to give good support without springing the stock or forcing it against the blade. Where turret positions are filled, it is possible to obtain a holder which will permit the placement of a drill or centering tool in the shank. Due to the fine adjustments that can be made, the box tool is often used as a finishing tool where close tolerances are required on the turned diameter.

*See page 61, TOOLING and PRODUCTION, May, 1952.

Both the circular form tool and the circular cut-off tool are used in the cross slide positions and in practically every instance, both tools are employed in a machining sequence. In designing form tools, care must be taken in having the proper relationship between the width of the form tool with both the diameter of the work and the contour shape. Thus, the limit of the width of a forming tool is usually expressed in the form of a ratio of approximately 2½ to 1, i.e., the width of the forming tool should not exceed 2½ times the smallest diameter. The reason that there is such a limitation is that the pressure of a wide forming tool may be so great as to cause the piece machined to spring or be twisted off. In many instances where wide forms are to be made, it may be better to have two form tools overlapping on both the front and back slides; in this instance, it may be possible to incorporate the cut-off within the last forming tool. A back rake of zero degrees is often employed in cutting materials from Group 1 alloys; the front clearances varying from 7 to 12 degrees depending upon the diameter of the tool. This front clearance can be accentuated by raising the tool holder so that the cutting edge is on the center line of the work. When alloys within Group 2 are to be formed, a back rake of from 5 to 10 degrees can be employed. The feed employed for forming will vary from 0.001 to 0.002 inches depending upon the

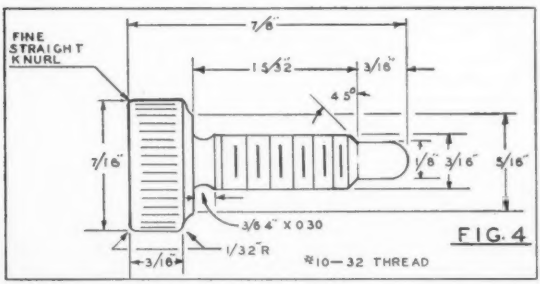


FIG. 4

Fig. 4:
Machine: O Brown & Sharpe
Material: 7/16" diam. Free Cutting Yellow Brass

Analysis

Copper	62.0%
Zinc	35.0%
Lead	3.0%

Operational Procedures

1. Stop
2. Turn (box tool)
3. Knurl Head
4. Form (back slide)
5. Thread
   Cut-off (front slide)

width of the form tool.

Flat and straight flute drills, having a natural zero degree rake angle, are widely accepted for those alloys within Groups 1 and 2. Usually where tolerances less than 0.002 inches are required in a drilled hole, a reaming operation normally is required. The slow spiral drill, commonly referred to as a 'brass' drill, with a decreased helix angle ranging from 10 to 22 degrees, and with wide, polished flutes and a thin web, provides large chip clearance with a decreased rake angle and is often used for deep hole drilling, for screw machine work, and other high speed drilling operations on Groups 1 and 2 alloys. To use heavy feeds without pulling the drill into the work, it may be necessary to flatten the cutting edge approximately 6 to 8 percent of the drill diameter. Several suggestions [5] in the drilling of deep holes are offered, thus: (1) use decreasing helix; (2) use two straight flutes; (3) rotate drills opposite to work to remove chips and obtain greater cutting speeds; (4) drill to depth equal to 5 times the diameter of the hole, then remove drill and finish with second operation; and, (5) half round drills reduce time by 50 percent; start hole with usual twist drill to center properly.

The speeds used in drilling will vary in accordance to the material that is to be machined and the diameter of the drilled hole. Thus, speeds varying from 250 to 350 feet per minute can be normally employed in the drilling of holes approximately 0.080 inches in diameter using Group 1 materials. An increase in speeds is permissible as the diameter of the hole increases. In the drilling of those alloys in Group 2, the drilling speeds are substantially reduced; the value being approximately 50 percent of that used with the alloys within Group 1. A floating holder is used for holding drills, etc.

A reaming operation usually follows drilling where the accuracy of the drilled hole is of importance; the speed of this operation also being dependent upon both the material and the size of the drilled hole. Normally, this speed usually coincides with that used for drilling. Most types of reamers can be used, however one difficulty which may be experienced in the use of straight fluted reamers is that of chattering. This often is overcome by the use of a spiral flute reamer having an approximate helix angle of from 7 to 12 degrees. It must be remembered that where a reaming operation is contemplated, sufficient stock should be left in the drilled hole so that a burnishing action

(Continued on page 58)

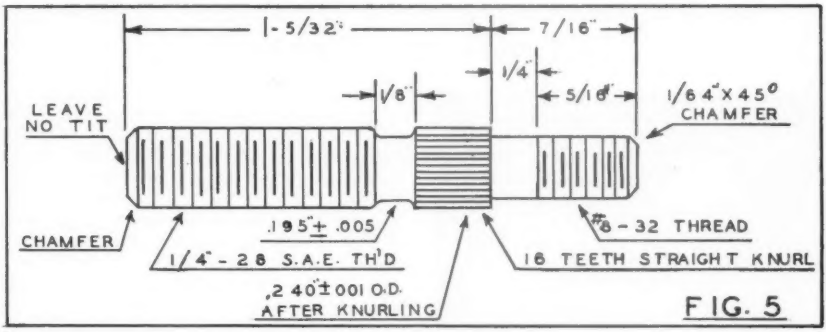


FIG. 5

Fig. 5:

Machine: OG Brown & Sharpe
Material: 1/4" diam. Leaded Bronze
Analysis

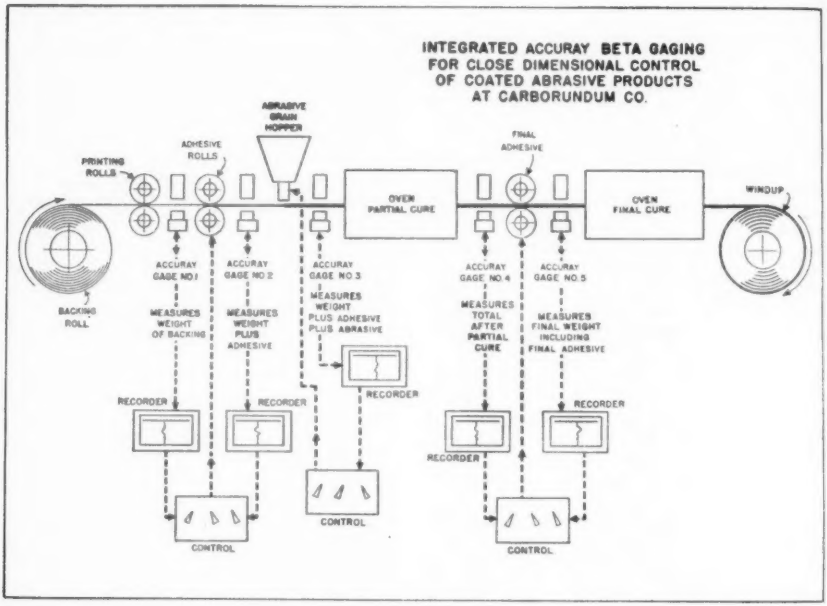
Copper	85.00%
Zinc	13.25%
Lead	1.75%

1. Feed

Operational Steps

2. Turn (box tool)
   Form (front slide)
3. Thread
4. Knurl
5. Feed
   Cut Off (back slide)

Fig. 1. This schematic sketch outlines how Carborundum and Industrial Nucleonics engineers combine precise gaging with close production control in the manufacture of coated abrasives.



Carborundum Applies Nuclear Physics to Production Control

A radical new production technique installed at Carborundum Company's Coated Products Division will set new standards of precision in the manufacture of coated abrasives. With the new production setup, Carborundum can control thickness and density of adhesive, abrasive, and final adhesive coat with an accuracy within one percent.

As a result, users of coated abrasives in the metalworking field can expect practically unvarying uniformity in every grade ordered. Rejects which cause disruption of production will be practically eliminated. It will be entirely practical for

Fig. 2. The radioactive isotope, stroutium-90, provides the beta-rays that actuate gage for continuous measurement of unit weight and density as backing material passes through abrasive coating machine at rates up to 350 ft. per min.

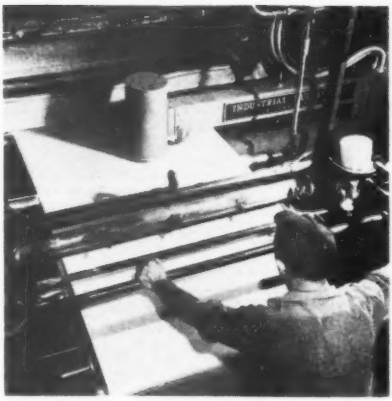


Fig. 3. "Accuray gage #2 measures weight of the backing plus weight of adhesive as material moves through coating machine. In background, abrasive particles flow onto the adhesive-coated backing.

customers to order coated products to strict specifications. This will facilitate further progress in precision grinding. An additional advantage to coated-abrasive users is that they can at any time get a precise duplication of a previous order, since Carborundum will have a complete graphic production record of every roll produced.

According to Carborundum's William A. Wendel, vice president and manager Coated Products Division, this installation is the first of its type in the abrasives field. Up to now, production control in the estimated $90-million-a-year industry has been on a cut-and-try basis. This required stopping of machinery, cutting out an edge sample, checking the sample, readjusting rolls and feeds. Overshooting on specifications was common to make sure of meeting minimum thickness and density standards. Actually, all manufacturers have had a continuing problem in rejects and returns, and they seldom welcomed "specials".

Carborundum's new technique, worked out with specialists of the Industrial Nucelonics Corp., Columbus, Ohio, integrates five "Accuray" beta-ray gages, actuated by radioisotopes, into the coated-abrasive machine production line.

Nuclear gaging is fast and super-accurate, so that automatic production control in the industry is at least commercially feasible. Each machine requires five Accuray gages. Gage #1 measures backing weight. This backing is usually paper, cloth, fiber, or combination. Variation in unit weight at this point affects future coating operations, such as adhesive roll setting. Thus, gage #1 furnishes a base measurement. Gage #2 picks up weight of backing plus weight of adhesive coat. Gage #3 measures weight of backing plus weight of adhesive, plus weight of abrasive. Gage #4 measures total weight after preliminary cure and before the final adhesive application. Gage #5 measures weight after adhesive application.

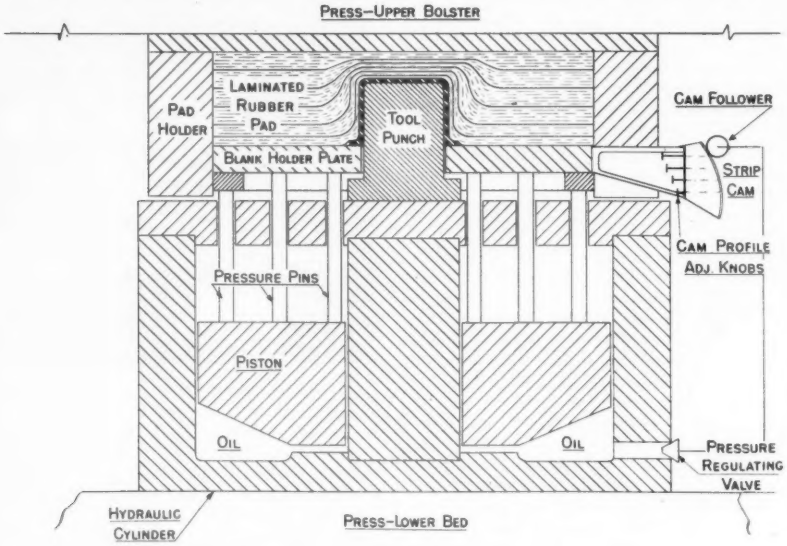
The Accuray gages are not influenced by outside factors such as temperature, dirt, or humidity. They do not contact the moving sheet at any time. In each gage, a sealed capsule of radioactive Strontium-90 emits beta rays. As the material being measured moves past the aperture between the sources and the dectector unit (a special type of ionization chamber), the amount of radiation passing through the material varies according to the density of the material.

The beta rays that get through the detector unit ionize a gas and thus create a voltage that provides a recording and controlling signal. Since the gage is

(Continued on page 60)

Fig. 4. Recorders, synchronized with the speed of the material passing through the coating machine, give continuous indication of whether specifications are being met. The charts can be filed for recording or duplication.

Fig. 1. Arrangement of the Marform components for a typical setup to form a metal cup.



"Marforming" Methods and Results

In an effort to overcome the economic limitations of conventional die forming techniques, the aircraft industry developed the Guerin process which utilizes a thick, rubber pad in lieu of steel female dies. When specifications called for relatively simple draws and little shrink work, this process achieved a substantial reduction in tooling costs on short runs.

The Marform process* was developed as an outgrowth of this conventional low pressure rubber pad process. The new technique extended the drawing possibilities of rubber pad forming by combining the best features of the steel die with its accurate deep forming ability, and the Guerin process with its economy in tooling.

This was accomplished by incorporating an integrally mounted blank pressure control mechanism which automatically regulates the blank holder pressure. The parts formed by this process are free of wrinkles and external draw marks. For this reason, Marforming is extremely valuable to the aircraft industry and manufacturers of electrical appliances, reflectors, household and kitchen products and to other industries making products where surface finish and depth of draw are critical.

The Marform process is best suited to hydraulic press operation where pressure and speed of operation can readily be varied and controlled. A typical Marform setup is represented in Figure 1, and shows a metal cup being formed.

This setup is representative of either a Marform packaged installation unit in an existing hydraulic press or a complete Marforming press as shown in Figure 2, with the Marforming unit built in as an integral part of that press.

In either case, a rubber pad holder is bolted or clamped to the upper holster of the press. A laminated rubber pad, cut a trifle oversize, is pushed inside of the pad holder to take the place of the con-

*Developed by Glenn L. Martin Company, Baltimore, in cooperation with Hydropress, Inc., New York.

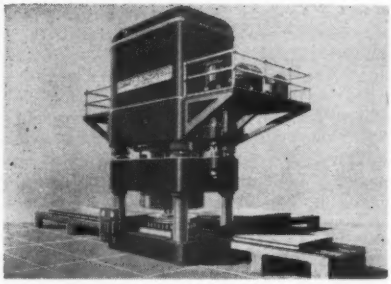


Fig. 2. Visualization of a 6500 Ton Integrated Lowey-Hydropress Marform Press adaptable for Marforming, Guerin Rubber Pad Forming and conventional steel die deep drawing. The same type of press can be supplied up to 13,000 ton capacity.

ventional female steel die.

In the case of a packaged unit installation in an existing hydraulic press, a punch is mounted at a fixed elevation on a hydraulic cylinder assembly which is set on top of the lower bed of a conventional press. A blank plate is cut to the inside dimensions of the rubber pad holder and the outside dimension of the punch, maintaining a clearance of approximately 1/16". This pressure plate rests on removable pressure pins which can be placed in any position surrounding the punch configuration. These pins rest on a piston supported by oil inside the hydraulic cylinder as shown in Figure 1. The position of the blank holder plate in relation to the punch is determined by the volume of oil in the hydraulic cylinder.

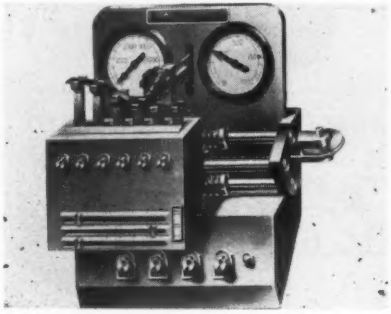


Fig. 3. Control Panel of Package Unit.

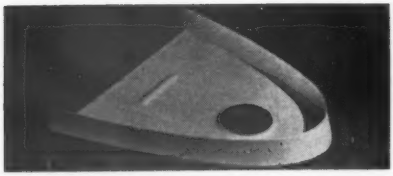


Fig. 4. Material 0.040", 24 SO aluminum, final condition full hard. Flange height 1⅜", radius at nose 1⅝" with a 15° closed angle. Press advance and return, 2" per second; speed 1/3 per second.

25 Pieces	Marform	Drophammer
Tooling Costs	$139.25	$344.50
Manufacturing Costs	23.70	47.00
Total Cost	$162.95	$391.50
100 Pieces		
Tooling Costs	$148.00	$344.50
Manufacturing Costs	66.00	157.00
Total Cost	$214.00	$501.50

The Marform control panel is illustrated in Figure 3 which shows a roller cam follower riding on an adjustable flexible steel strip cam. This action determines the portal opening of a pressure regulating valve connected to the discharge side of the hydraulic cylinder as illustrated schematically in Figure 1. The rate of fluid discharge from this hydraulic cylinder determines the pressure exerted on the blank at any position of the blank holder plate and depth of draw.

To start the operation, the blank is placed on top of the blank holder plate which is initially at the same elevation as the punch. As the upper bolster descends, the rubber contacts the blank and is sealed in the holder by the blank holder plate as shown in Figure 1.

(Continued on page 88)

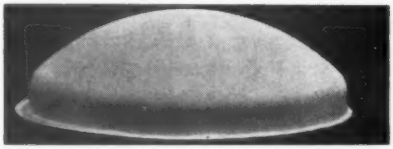


Fig. 5. Material 0.091", 52 SO aluminum, 22" dia., 7" deep. Press advance and return, 3" per second; pressing speed, 1/3" per second.

100 Pieces	Marform	Spinning
Tooling Costs	$219.00	$186.81
Manufacturing Cost	15.00	67.60
Total Cost	$234.00	$254.41
2,000 Pieces		Steel Draw Dies
Tooling Costs	$219.00	$1,805.00
Manufacturing Costs	214.00	195.00
Total Cost	$433.00	$2,000.00

. . . **Free Cutting Copper, from page 53**
is not experienced resulting in undersized holes; this being especially important where the wall thickness is small in relation to the hole diameter. The feeds employed in reaming free-cutting brass is between 0.007 to 0.010 inches depending upon the size of the drilled hole.

The standard two, three or four fluted tap with narrow lands, deep polished flutes and a two or three thread chamfer is usually satisfactory in tapping the free-cutting copper base alloys. Some difficulty may be experienced in the tapping of blind holes, however, in most instances, this can be minimized by providing for adequate chip relief and employing an ample quantity of cutting fluid. The selection of proper diameter tap is necessary in order to avoid either tap breakage or torn threads; the importance of this factor increasing as the machinability of the material decreases. On working the Group 1 alloys on automatics, maximum spindle speeds are frequently used when the tapped hole is relatively small or where the threads have a fine pitch. Usually, a value of from 250 to 150 feet per minute is given as the recommended speed in the tapping of Group 1 alloys; this speed being reduced approximately 50 percent when tapping the alloys within Group 2. As these values are for high speed taps, further reductions may be necessary when carbon steel taps are employed.

Circular, radial and tangenital thread chasers for self opening die heads and tap chasers for collapsible taps are being satisfactorily used for internal and external threading of the free-cutting copper base alloys. The hook on taps and chasers should always be kept to a minimum; one instance found that a negative 7 degree rake angle had been successful. Where positive rake angles are employed, this value should not exceed 2 to 4 degrees. Where circular chasers are employed, a face angle of zero degrees is employed in combination with both a hook angle of 5 degrees and a clearance angle of approximately 12 degrees when alloys within Group 1 are threaded. Those alloys within Group 2, when threaded with circular chasers, the tool face angle is approximately 2 degrees and the hook angle may vary from 10 to 20 degrees. In either case, the throat angle is about 25 degrees. The suggested rake angles should be modified by the relation of the pitch to the diameter of the thread, the thread form, the thread fit required, and other special considerations. In the threading of those alloys within Group 1, the maximum spindle speed is frequently employed when threading small diameter work or parts with fine pitch threads. This factor however must be determined in relationship to the variables presented within the individual problem.

The advantage of 'overlap' operations is characteristic of the Brown & Sharpe automatics; this also being true of most automatic machines. Thus, in many cases, either drilling or reaming can be performed by a position in the turret while the cross slide containing a forming tool can operate simultaneously. Thus, Figure

(Continued on page 124)

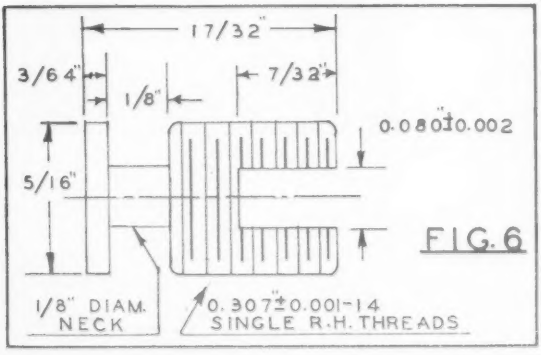


FIG. 6

Fig. 6:
Machine: O Brown & Sharpe
Material: 5/16" Diam. 10% Leaded Nickel Silver

Analysis

Copper	46.50%
Nickel	10.00%
Zinc	40.75%
Lead	2.75%

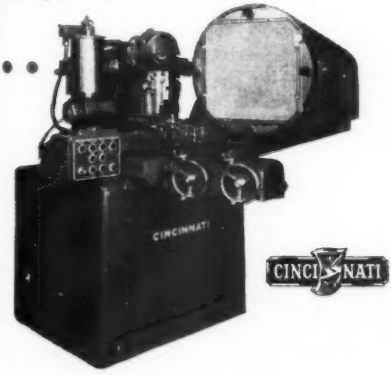
Operational Procedure

1. Stop
2. Turn Thread Diameter (box tool)
3. Rough Thread (open die)
4. Finish Thread (open die)
   Form (front slide)
   Cut-off (back slide)

PROJECTO-FORM

Gives you a ringside seat of accuracy in the making

- CINCINNATI Projecto-Form, for accurately grinding tool and die parts:
- Standard projection lens 20X
- Special projection lens 40X
- Standard width of grind, one setting ..... .9"
- Maximum longitudinal adjustment ..... 4½"
- Complete specifications in catalog M-1612



Like television, CINCINNATI Projecto-Form Grinding Machines eliminate a lot of intermediate steps and show you exactly what's happening at the point of action. Through an arrangement of lenses and a mirror, an intense light projects a silhouette of the work and wheel to a ground glass screen in front of which the operator is seated. A "drawing" of the desired contour, twenty times size, is cut on a glass plate coated with a tinted translucent emulsion. Mounted on the viewing screen, the drawing furnishes a guide to which the operator works. With two micrometer adjusting handwheels, he adjusts the wheel vertically and transversely while it reciprocates over the work. Grinding continues until the image of the work matches the drawing. You may obtain complete specifications by writing for catalog M-1612.

THE CINCINNATI MILLING MACHINE CO.,
CINCINNATI 9, OHIO

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

. . . Production, from page 55

calibrated, variations in beta-ray transmission cause changes in signal that vary directly with change in weight per unit area. Recalibration is never necessary. The radio-active isotope is inspected every six months although its life is 30 years.

Signals from the gages are translated into a trace on pen recorders. Superimposing the trace signal from gage #1 and the signal from gage #2 (each a different color) on one recorder, provides a visual comparison of machine coating. The two superimposed signals from gage #2 and gage #3 on a second recorder shows immediately any deviation from specification. When the two traces overlap, the material is being made properly, any change is immediately noted. With its source known, proper correction in adhesive roll setting, abrasive feed, final adhesive roll setting or speed of paper through the machinery can be made.

With a setup like this, it is possible to produce on a practical manufacturing basis uniform coatings despite lot-to-lot variations in backing materials, the slightest variation in flow of adhesive or abrasive onto the moving web, or variation in machine speed. In conventional manufacture, such errors tend to compound and might cause complete rejection of the finished product with loss of production time.

Coated abrasives are used in practically every manufacturing activity. Most everyone knows them in the common form of sandpaper, but the commercial product comes in rolls, discs, belts, pads with many variations in the abrasive material (aluminum oxide or silicon carbide) and to many specifications of thickness and density of abrasive, resin or adhesive coats, or backing.

Each of these components and their amount on a given area has an effect on performance of the coated product in stock removal, product finishing, in metal, wood, glass, plastics and many other industries. Also, modern precision grinding methods have inevitably led users to demand very close control of coated abrasives. Since manufacture is a continuous process makers have been scratching their heads for years looking for a way to control the various feeds on the fast-moving machinery to produce products to strict specification. Progress in backing materials, adhesives, high-performance abrasive materials has been steady in the industry. But progress in production control has lagged behind the procession.

The integration of continuous gaging with production control on an automatic basis is expected to pay for itself in a matter of months on the basis of savings to Carborundum alone. The company is finding other plusses, too.

Process control is relatively simple, requires no additional operator skills. It is actually easier than previous methods. The gages are sturdy, can easily be shifted. And they are fitted with simple-to-use traversing controls that permit measurement at any desired point across the travelling web being processed.

★ ★ ★

The Airtemp Division of Chrysler Corporation, Dayton, Ohio, is manufacturing the army's newest tank gun range finder. With the new device the tank gunner ranges and continually tracks his target.

The range finder automatically sets the gun for the required distance to the target and is adjustable to allow for the type of ammunition being fired.

Carl E. Bucholzer, Airtemp president, said that, while the new range finder is a big step forward in fire control instruments, it also represents a production job that involves several precision techniques with which the industry has had little experience.

★ ★ ★

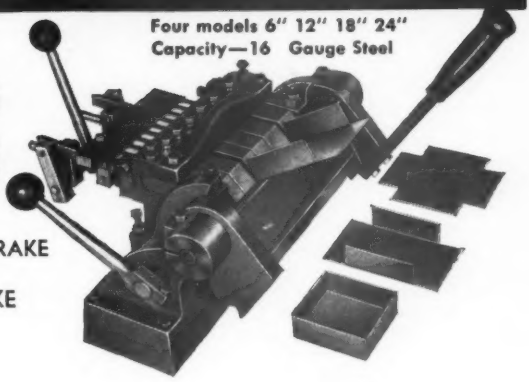
"For example", he mentioned, "optical glass in the instrument is bonded directly to metal mounts without mechanical fasteners. In addition, the entire instrument must be hermetically sealed against atmosphere. Still another process, which is seldom required except for computing mechanisms, entails the production of accurate non-circular gears."

Starting production of the range finder, a complex example of optical, electronic and mechanical systems, involved much more than merely converting existing plant facilities. To accommodate additional equipment and personnel, a new 76,000 square foot building was added to the Airtemp factory.

New! di-acro BOX FINGER BRAKE

Four models 6" 12" 18" 24"
Capacity—16 Gauge Steel

3 TOOLS IN ONE



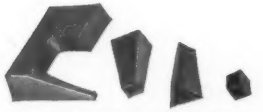
1 BOX and PAN BRAKE

2 STANDARD BRAKE

3 BAR FOLDER

Versatility from the word GO!! One box or 10,000—can be economically produced with the new Di-Acro Box Finger Brake. The complete box finger bar also serves perfectly for all standard brake operations. An Acute Angle Bar—quickly mounted—converts the brake to a bar folder for locks, seams, hems and sharp angles. The unique Di-Acro Open End Finger forms square or triangular tubes and other similar parts difficult to make.

Real machine tool construction, with hardened and precision ground box fingers, assures permanent accuracy in producing duplicated parts. The Box Finger Bar can be easily mounted on all standard Di-Acro Brakes.



OPEN END FINGER
for forming triangular, square and rectangular tubes.

Send for
40 PAGE CATALOG
describing DI-ACRO Shears, Punches, Benders, Brakes, Notchers and Rod Parters,—also Power Shears and Benders.

Di-Acro is pronounced "DIE-ACK-RO"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

315 EIGHTH AVENUE, LAKE CITY, MINN.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Dual Slide Hydraulic Duplicating

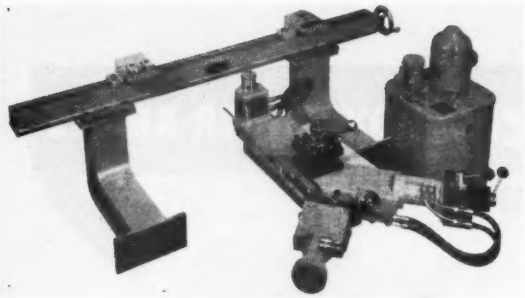


Fig. 1. (left) The dual slide follower consists of the hydraulic power unit, a selector valve to determine which movement is to be under tracer control, a hydraulic cylinder powering each 45° slide, and the tracer valving which transmits the shape of the master to the work.
Fig. 2. (below) With the dual-slide method parts with contours on the diameter or face can be duplicated, or both in combination if desired.

The technique of machining by duplication and the adaptation of the duplicating process controls to machine tools are well established in precision work shops. Naturally, the best use of these controls is obtained only when the operators and engineers are thoroughly familiar with the characteristics and potential advantages of the equipment.

Usually, when following a master pattern or profile the tracer stylus is subject to either one of two conditions; i.e., it is either being deflected (by the templet edge or surface) or it is "seeking" (the templet edge or surface). The deflected condition is the more desirable conditon because any change in the contour being travelled over is instantly reproduced since the tracer is in action and is most sensitive and responsive to "changing signals". This is referred to as the positive position, and the opposite (or seeking, or no-load) conditions is called the negative position.

Every accurate job should be approached with the idea of keeping the tracer in the deflected condition at all times.

To attain this objective, the Turchan Follower Machine Company has developed a new combination of slides for lathes which allows the tracer action to be in its positive (deflected) position at all times so the very closest tolerances in final sizing can be attained.

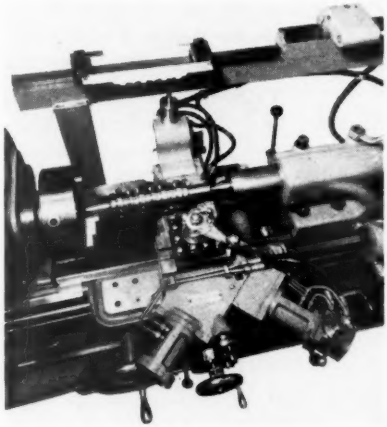
This slide assembly is known as the dual-slide follower and consists of a cross slide, intermediate slide, and compound slide, as shown in Figure 1.

With the compound slide and intermediate slide each mounted at 45° to the centerline of the lathe and 90° to each other, a completely new combination of movements is available. The 45° compound movements are controlled through the tracer actuated hydraulic cylinders, while the cross and longitudinal travels are still obtained from the conventional lead screws.

The hydraulic circuit is basically simple, giving a precision, yet rugged control of movements at all times. A hydraulic pump supplies oil, under pressure, to the tracer, which meters the oil to the cylinder, through a selector valve, establishing the fluid cycle of pump to tracer, to cylinder, back to tracer and returning to the power unit sump.

With the combination of the 45° movements under tracer control and the other

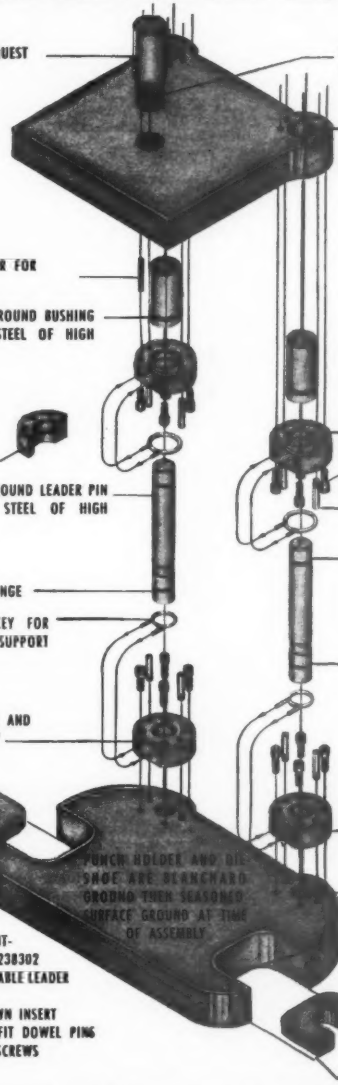
(Continued on page 70)



E. A. BAUMBACH MFG. CO.

1812 SO. KILBOURN, CHICAGO 23, ILL.

Advantages of Baumbach Demountable Pins and Bushings in Standard Precision Die Sets
Accuracy and Alignment
Flexability Reduced Die Costs—Reduced Maintenance Costs—Safety and Hold Down Insert


SHANK—¾ TO 3" UPON REQUEST
1¼–12 STANDARD THREAD LARGER UPON REQUEST
CLEARANCE HOLE FOR BUSHING
KEY-TAPERED AND TRIANGULAR FOR LOCKING SHANK
BAUMBACH HARDENED AND GROUND BUSHING MADE OF SPECIAL ALLOY STEEL OF HIGH MANGANESE CONTENT
MILD STEEL FLANGE WITH MOUNTING FACE PRECISION GROUND AT RIGHT ANGLES TO INSIDE DIAMETER OF BUSHING
ENTRY FOR DIE CASTING WITH APEX #3 TO KEY PIN IN POSITION
BAUMBACH CAP SCREW
BAUMBACH RITE FIT DOWEL PIN
BAUMBACH HARDENED AND GROUND LEADER PIN MADE OF SPECIAL ALLOY STEEL OF HIGH MANGANESE CONTENT
OIL GROOVE
.006 PRESS FIT PIN INTO FLANGE
SPECIAL APEX #3 ALLOY KEY FOR MAXIMUM SHEAR STRENGTH AND SUPPORT
KEY GROOVE
NOTE LOCATION OF SCREWS AND DOWELS FOR ADDED RIGIDITY
MOUNTING FACE PRECISION GROUND AT RIGHT ANGLES TO OUTSIDE DIAMETER OF PIN
PUNCH HOLDER AND DIE SHOE ARE BLANCHARD GROUND THEN SEASONED SURFACE GROUND AT TIME OF ASSEMBLY
CLEARANCE HOLE FOR PIN
BAUMBACH DESIGN GIVES ADDED WORKING AREA AND STRENGTH
HOLD DOWN INSERT
WELD CHANNEL

SET ASSEMBLY CONSISTS OF

1—SHANK AND KEY
1—PUNCH HOLDER
1—PAIR BAUMBACH DEMOUNTABLE BUSHINGS PAT. #2238302
1—PAIR BAUMBACH DEMOUNTABLE LEADER PINS PAT. #2238302
1—DIE SHOE AND HOLD DOWN INSERT
1—SET OF BAUMBACH RITE FIT DOWEL PINS
1—SET OF BAUMBACH CAP SCREWS

WRITE FOR FULL DETAILS OF BAUMBACH'S AUTOMATIC ALIGNMENT WITH PAT'D. DEMOUNTABLE LEADER PINS, BUSHINGS

DIE SET, LAYOUT SHEETS AND CATALOGS FURNISHED UPON REQUEST

Temco Time Savers Designed by Production Employees

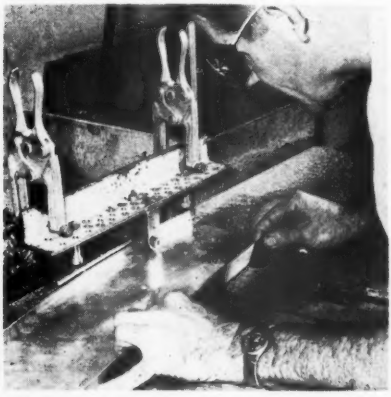
Trimming Fixture

A special attachment for Yates American Shapers is being used at Temco Aircraft Corporation, Dallas, Texas, to enable one man to trim large contour frames in less time than was required by two operators under the methods previously used.

Previous to the development of the device by Floyd I. Wright, a Temco employee, the company followed the general industry practice of bolting the frames to wood forms for trimming. As some of the frames were large, the forms were heavy and hard to handle. Two men were required to handle many of the forms and the hands of the operator were in constant danger from the unprotected cutting blade. In the event of a warped form, it was often necessary to discard frames due to incorrect trimming.

Wright's attachment consists of three fiber rollers mounted on a section of angle iron. Two of the rollers are mounted on vertical axes and roll on the inside of the frame's flange, holding it against the saw. The third roller, which is mounted on a horizontal axis, rolls on the flat surface of the frame, holding it against the table top. The entire assembly is secured to the guide angles of the shaper by two quick clamps.

Since Temco adopted Wright's device, there has been no necessity for a large stockpile of wood forms. One man can perform almost all trimming operations, as the attachment does all holding, making it unnecessary for the operator to do more than feed the frames to the saw. There is no necessity for the operator's hands being near the blade, thus eliminating a safety hazard.



Cutter Wrench

A special wrench, made from used rivet shaver cutters, is being used at Temco Aircraft Corporation, to remove dulled cutters from rivet shavers quickly and easily, with a resulting reduction in machine down time and maintenance cost.

The wrench was developed by W. H. Siler, also a Temco production employee, when he found that the accepted methods for removing cutters often required disassembling the shavers. Inexperienced persons sometimes damaged the shavers while trying to remove the cutters, thus causing high maintenance costs and unnecessary machine down time.

Siler's wrench is made from a used cutter from which the cutting tip has been removed. The cutter is welded to a "T" handle made from ⅜" drill rod. The slot left by removing the cutting tip fits over the cutter in the barrel of the shaver, making it possible to quickly and easily unscrew the cutter from its shaft. Cutters may be replaced in the same manner.

first & finest!

Jones & Lamson Radial Chaser Die Heads

GROUND with THREAD CHASERS

These Die Heads will do an outstanding job on large or small lots, in pitches ranging from extremely fine to coarse multiple Acme.

They are versatile tools with an over-all capacity of from No. 8 to $4\frac{1}{4}$".

They require no more than the proper chasers to cut either right- or left-hand threads. No extra equipment is needed.

They are easy to install and simple to handle. For almost half a century J&L Dies and Chasers have been the answer to a multitude of threading jobs throughout the world.

Look at these features that make [illegible] field and give you better threads at lower cost:

STRENGTH

Every part is of solid steel, hardened and [illegible]. There are no built-up sections. Dependability and ultimate capacity are [illegible].

FLOAT

All models are built with both concentric ar[illegible] inal float.

DUAL-DIAMETER CONTROL LEVER FOR ROUG[illegible]ND FINISHING CUTS

Heavy rough cuts, followed by light, accurat[illegible] cuts can be taken with the same set of chasers by merely moving the roughing at[illegible]ent lever. This is often a chaser saver on heavy, coarse pitch jobs, especially where [illegible] chamfers are a requirement.

SIZE ADJUSTMENT

The external micrometer adjusting screw pr[illegible]es simple and precise setting to exact pitch diameter. It is easy to set and maintain [illegible]s well within your thread tolerances.

RAPID CHASER CHANGE-OVER

Chasers are removed for resharpening, or size r[illegible]acement, by merely removing the front cover of the Die. No tools are required. Char[illegible]-over is a matter of seconds which means more hours available for production.

Write to Dept. 710 for illustrated catalog and complete information.

Write to Dept. 710 for illustrated catalog and complete information on these and Tangent Chaser Types and Dies for Brown & Sharpe machines.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. J&L DIE HEAD DIVISION

RCA Assembly Problem Solved

The use of Wilton "Junior" Powrarms, combined with a special ingeneously designed fixture, has solved a ticklish problem for the RCA plant in Los Angeles.

A special fixture was needed to hold rectangular parts ranging in size from 2" x 3" to 18" and cylindrical parts from 6" to 14" in diameter and weighing from ½ to 12 lbs. Several sides of the parts had to be accessible to the assembly operators, and mobility was needed as all parts had to move from one assembly operator to another independently. Appropriate fixtures were designed and it was decided to mount the fixtures and Powrarms on a dolly equipped with roller skate wheels which travel on iron tracks affixed to continuous bench height tables.

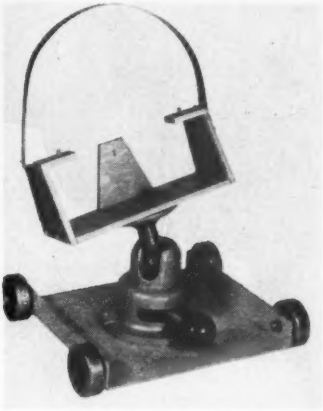
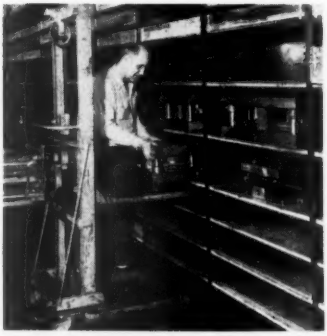


Photo courtesy The Wilton Tool Co.

The "Junior" powrarm is an all-aluminum, light duty positioner and will hold up to 24 lbs. of weight. It actually provides an assembly operator with a "Third Arm" as it holds work, positions it, and locks the work at any angle desired. Thus all sides of the work are available to the assembly operator.

As a result of the RCA installation of these mobile positioning units handling time of each assembly operator was decreased 50%, and the cost of the entire investment has been written off.

Versatile Shoplifting



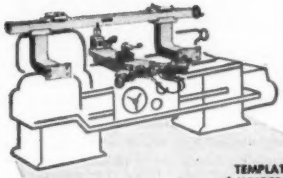
These views show the versatility of Economy Engineering Company's "Shoplifter".

Above, is a most frequent chore, the handling of dies in and out of storage, and to and from presses.

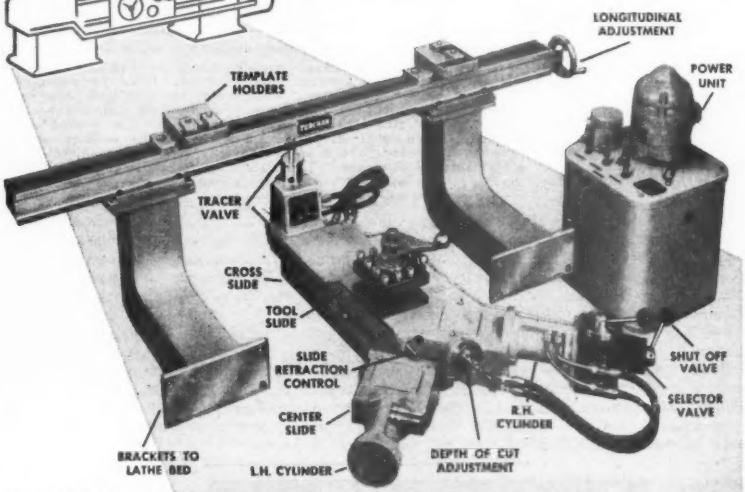
This pair of illustrations shows the two steps whereby 2 men load 450 lb. reels of 24 gauge steel on to the feed reel in a few seconds. With the "Shoplifter" deck lowered to the level of a reel on the handling pallet, the reel can be slid aboard, then raised so that it can be slid off and over the reel fingers. Formerly it took several men 5 to 10 minutes on the same job.

Photos courtesy Economy Engineering Company

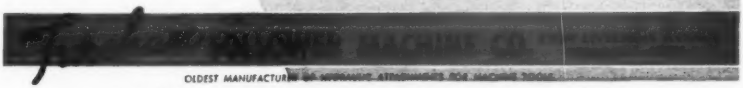
Greatest advance in turning since the invention of the metal-working lathe



Turchan hydraulic dual duplicator gives 4 to 6 times faster production



Just add this Turchan dual-turning follower to your **standard lathes** and watch the costs go down! No more need for costly special form tools. No skilled help required. Job set-up time can be cut to a small fraction. A cross slide equipped with two compounds at 45° to center line and 90° to each other replaces the conventional arrangement, allowing a **new combination of movements.** The 45° compound movements are controlled through a tracer, guided by template or full size model, while the cross and longitudinal travels are obtained with the regular lead screws. This **doubles** tool approach to the work. Only one slide at a time is controlled by the tracer. Machining of right or left square shoulders, bevels, tapers, steps, undercuts, radii, and contour facing is easily accomplished. All this faster, more accurately (to .001"). Also other Turchan Follower attachments for milling machines, planers, shapers and grinders. "Turn to Turchan to cut costs."



Get All the Facts—Write for Descriptive Booklet

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Automatic Recording of Welding Performance

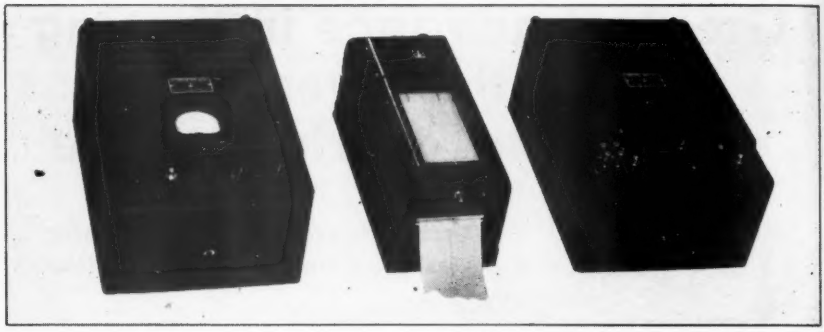


Photo courtesy The Brush Development Company.

Single-phase and three-phase resistance welding machine variables can be reduced to a written record by the equipment shown above. Welding current and electrode force are measured and recorded simultaneously, and show the important squeeze, weld, hold, and off time intervals. The apparatus, as shown from left to right, consists of a d.c. amplifier, a dual channel oscillograph, and a universal analyzar. The new analyzer also records the small 180 cycle per second component present in three-phase welding current when ignition rectifiers are used. The welding engineer can adjust the welding machine as the measurements are being made, due to the immediate availability of the information on the direct-writing oscillograph. The operating variables of resistance, spot, projection, and seam welding machines can also be accurately recorded.

A Critical Shortage of 18,000 Engineers is restricting production, distribution, research and development in 450 major industrial companies. This was disclosed today by L. L. Dresser, president of the National Society of Professional Engineers, in his report on the Society's nationwide survey of engineering manpower utilization.

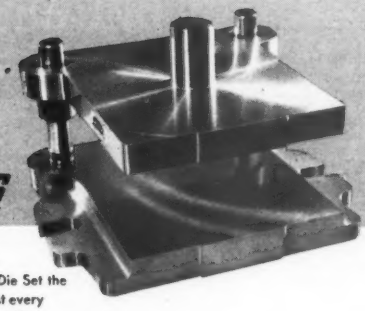
"Industry urgently needs engineers to keep America's industrial machine operating at peak efficiency," Mr. Dresser said. "Since the necessary engineers are not available, the only answer is better utilization of existing manpower".

The NSPE survey, conducted among companies which employ 99,000 engineers of a total of 2,500,000 persons, showed that they need 10,000 engineers by September 1st. It is also revealed that many firms realize that more effective utilization of engineering personnel is the only immediate method of easing the shortage. The survey, which will be published in report form this fall, indicates techniques which have successfully been used to combat the shortage, and is a practical working guide to all industry.

Typical of the uses for silver brazing alloys which have increased the industrial use of the metal in recent years is this operation showing the silver brazing of burster tubes for shells. With a turntable and movable induction heating coil setup, the operator places the prepared parts on the locating studs and removes the finished parts.

Photo courtesy
Handy & Harman

DANLY DIE SETS PLUS



Reliable Danly precision makes every Danly Die Set the finest base for exacting die work—and in almost every case there's a *standard* set to meet your need!

DANLY DIEMAKERS' SUPPLIES PLUS

This complete line features nearly all the parts diemakers need, made to diemakers' standards. Clamps, auto-gages, swivel adapters, punch shanks and many other items in addition to those shown here are also included.

A NATIONWIDE BRANCH PLANT SYSTEM

*CHICAGO 50, 2100 South Laramie Avenue
*CLEVELAND 14, 1550 East 33rd Street
*DAYTON 7, 3196 Delphos Avenue
*DETROIT 16, 1549 Temple Avenue
*GRAND RAPIDS, 113 Michigan Street N.W.
INDIANAPOLIS 4, 5 West 10th Street
*LONG ISLAND CITY 1, 47-28 37th Street
*LOS ANGELES 54, Ducommun Metals & Supply Co. 4890 South Alameda
MILWAUKEE 2, 111 East Wisconsin Avenue
*PHILADELPHIA 40, 511 W. Courtland St.
*ROCHESTER 4, 16 Commercial St.

*Indicates complete stock

EQUALS FAST, COMPLETE SERVICE

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue • Chicago 50, Illinois

DANLY

DIE SETS AND DIEMAKERS' SUPPLIES

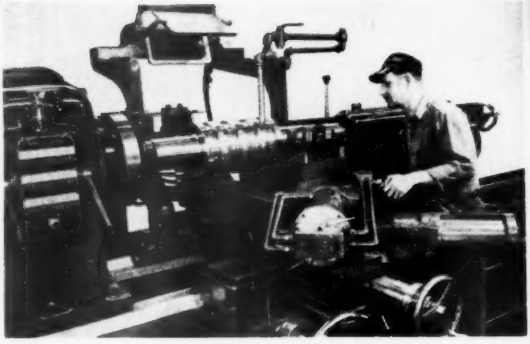
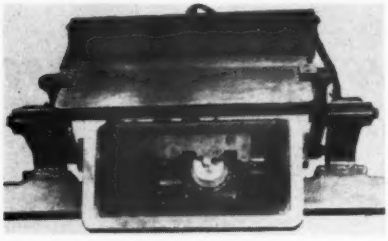


Fig. 3. (right) Work size is limited only by the capacity of the lathe. All tracer controlled movements can be locked in position by the selector valve. Thus, when the cut is completed it is not necessary to follow the path of the template in taking the tool away from the finished cut. This eliminates tool drag on the finished surface and is especially important when duplicating deep contours where quality surfaces are required.
Fig. 4. (below) A close-up of the mirror arrangement in Figure 3 which permits the operator to check the tracer and template relationship.



feeds under mechanical control it is possible to keep the tracer deflected simply by switching from one hydraulic cylinder to the other as the shape demands. In extreme cases the conventional lead screw feeds can also be worked in conjunction with tracer controlled movements so the tracer is constantly deflected.

A mechanical feed in one direction would require the tracer controlled cylinder to be in a position so it is constantly backing up, and when a condition approaches such that the tracer would have to reverse then a new combination of cylinder and conventional feed would be placed into acton.

Only one slide at a time is used and controlled by the tracer. Thus, one can machine square shoulders on the right and left hand side of the work, including under-cuts and radii.

There are thousands of parts that would not demand the tolerances possible with this combination of movements, but where the closest possible tolerance is specified the means is now available to squeeze the limits down to where the turned finish obtainable from the machine tool is the only limiting factor.

With the combination of dual tracer slides and conventional feeds it is feasible to turn any contour that allows the tool to enter the workpiece, but the big advantages lies in jobs where the contours are intricate and the tolerance demands are close. This is usually true in the turning of large rolls for rolling mills, where there is a great variety of roll profiles which are constantly being machined or re-machined.

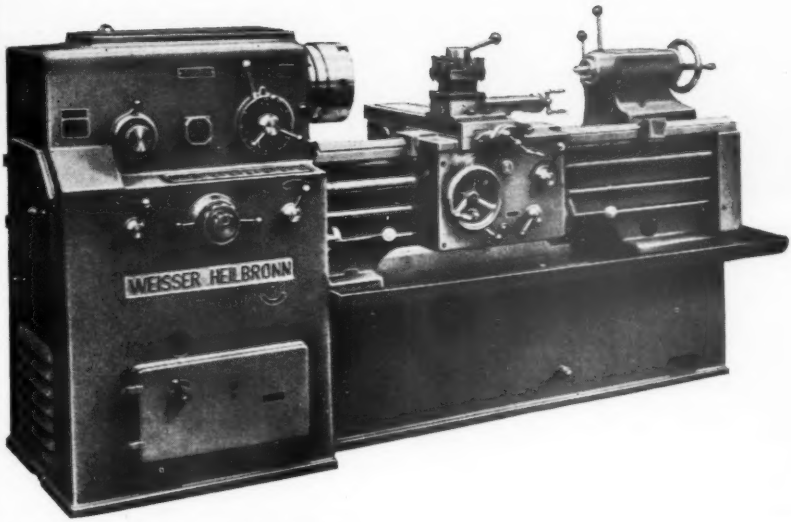
A typical job that can be turned readily is shown in Figure 2. Notice the many contours of various angles and radii. Rolls of much larger size, limited only to capacity of the lathe, are turned just as easily with this dual-turn unit. The size and rate of removing stock is likewise limited by the existing machine and tools only, as the tool is fully supported from holder to carriage which gives a construction desired to obtain the best cuts.

A follower of this type allows single point tooling to be used, thus giving the best surface finishes since surface speeds can be stepped up to take advantage of present day cutting tools. The elimination of form tools also reduces the tooling cost, and with a few standard tool types the operator can handle just about every contour the roll could possibly require.

Keeping the tracer in its best possible duplicating position (positive) and using good solid tooling, results in the best of finishes, repeatedly and accurately.

WEISSER HEILBRONN

... always among the best!



GOLIATH *The Modern High Speed Lathe*

Modern design based on the utilization of progress in modern lathe construction and our own experience gathered over many years. Novel bed-construction with chip-slide to the rear. Gears and shafts hardened and ground. Patented quick clamping device which allows removal or attaching of chucking elements in a few seconds. Norton box w/o link motion. Automatic release of apron accurate up to .0004" through patented construction.

80 HIGH SPEED PRODUCTION LATHES • 20"-28¼" ENGINE LATHES WITH REMOVABLE GAP
HYDRAULIC COPYING ATTACHMENTS • TOOL ROOM LATHES

— QUICK DELIVERY ON ALL MODELS —

Write for Detailed 32-Page Catalogue and Prices

Exclusive U. S. Distributors
SERVICE • PARTS

GUTHERY MACHINE TOOL CORPORATION

130 WEST 42nd ST. NEW YORK 36, N. Y.

. . . Machining, from page 51

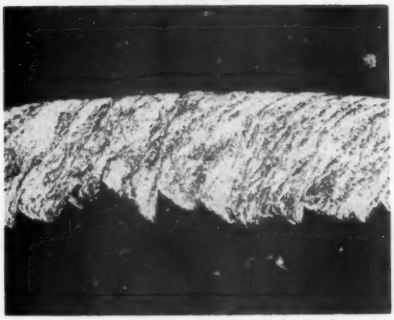


Fig. 9. Typical Chip fom a High Carbon Titanium Part.

often the coolant is cooling the work or the tool but not the cutting zone and, therefore, no value is received. Consideration should be given to having the coolant feeding through the tool post or tool shank.

No discussion of this type is complete without the mention of titanium and its alloys. There has been a considerable amount of literature on the machining of titanium. Some of it is sound, quite a bit has been hearsay. Westinghouse has been investigating the application of titanium for compressor discs and other parts for the past several years.

In these studies data have been accumulated pertaining to the machining characteristics of this new material. With proper alloy selection, tool design, and use of recommended feeds and speeds, titanium is machinable but still with difficulty.

Figure 7 and 8 show the effect of carbon content on the microstructure of the 1.0-per cent iron, 2.5 per cent chromium titanium alloy. It should be noted that there is an increase in titanium carbides in the alloy with the 0.7 per cent carbon as compared to the alloy with the 0.24 per cent carbon. Because titanium carbide is harder than the tungsten carbide found in most tools, excessive tool wear will result.

The matrix metal is characteristic by being work-hardenable to a degree below that of the 18-8 stainless steels but is tough and has a high shear strength. In addition it has the tendency to smear or build up on a tool. A typical chip from a high-carbon titanium part is shown in Figure 9.

Because of these properties, the material falls into the difficult-to-machine class. Figures 10 and 11 show how increased tool life can be obtained by varying the carbon level in the material and by using hard grades of carbide.

Figure 12 shows the appearance of two different grades of carbide tips—super

(Continued on page 77)

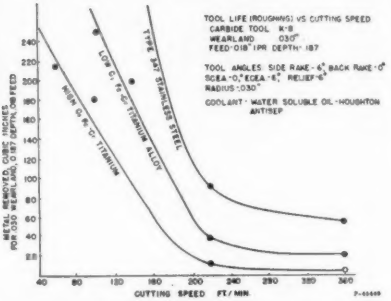
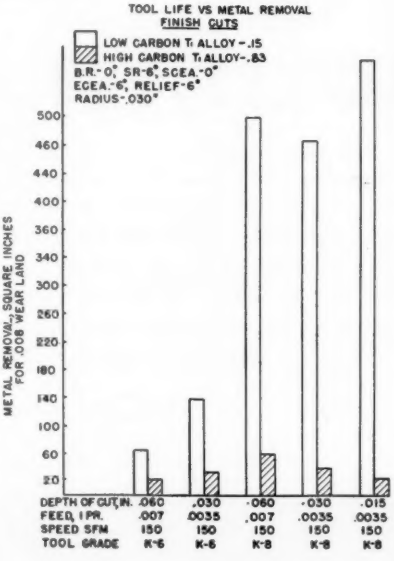

TOOL LIFE (ROUGHING) VS CUTTING SPEED
CARBIDE TOOL K-8
WEAR LAND .030"
FEED .018" IPR DEPTH .187
TOOL ANGLES SIDE RAKE - 6° BACK RAKE - 0°
SCEA - 0° ECEA - 6° RELIEF - 6°
RADIUS - .030"
COOLANT - WATER SOLUBLE OIL - HOUGHTON ANTISEP
TYPE 347 STAINLESS STEEL
LOW C, 1% Cr TITANIUM ALLOY
HIGH C, 4% Cr TITANIUM
METAL REMOVED, CUBIC INCHES FOR .030 WEAR LAND, .018 DEPTH, .018 FEED
CUTTING SPEED FT/MIN.

Fig. 10 above and Fig. 11 below. Increased Tool Life can be obtained by varying the Carbon Level in the Material and by using high grades of carbides.

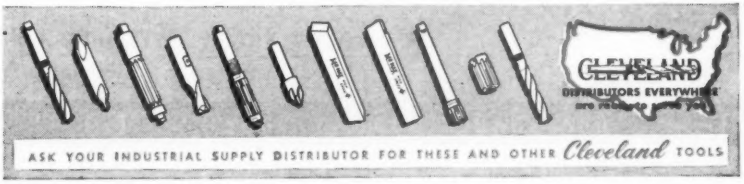

TOOL LIFE VS METAL REMOVAL
FINISH CUTS
LOW CARBON Ti ALLOY - .15
HIGH CARBON Ti ALLOY - .83
B.R. - 0° SR - 6° SCEA - 0°
ECEA - 6° RELIEF - 6°
RADIUS - .030"
METAL REMOVAL, SQUARE INCHES FOR .008 WEAR LAND
DEPTH OF CUT, IN. .060 .030 .060 .030 .015
FEED, I PR. .007 .0035 .007 .0035 .0035
SPEED SFM 150 150 150 150 150
TOOL GRADE K-6 K-6 K-8 K-8 K-8

test proves that *Better Wearing Qualities* give you 42% MORE HOLES PER GRIND

It was a smooth-running job—drilling 1½" holes in a cast iron cover, ½" thick—but the superintendent wasn't satisfied with the wearing qualities of the high speed drills that were being used. They averaged 2705 holes per grind. ◈ When a *Cleveland* Service Representative was called in, he recommended a stock CLE-FORGE High Speed Drill that is engineered to reduce the wear caused by abrasive action. With no change in feed or speed, this drill averaged *3862* holes per grind! ◈ On *all* drilling operations, a *Cleveland* Service Representative can help you *speed the job* and *cut costs.* Contact our nearest Stockroom, or . . .

Telephone Your Industrial Supply Distributor

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street • Cleveland 14, Ohio
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5 • Los Angeles 58
E. P. Barrus, Ltd., London W. 3, England



ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Puts Small Parts Shaping On A Truly Efficient Basis

Atlas

7" SHAPER

Are you shaping small parts on a big machine? The Atlas saves set-up time, and power — machines to close tolerances — and releases your big equipment for the work it's best suited to handle.

The Atlas is the only 7" shaper that is *Timken bearing equipped* — the only 7" shaper with *roller bearings on countershaft spindle, cast iron bull gear with 1" face,* and provision for *outside* stroke adjustment. Built exceptionally heavy and rugged. Has ground ways, 4 speeds, 5 reversible automatic power cross feeds. These are just the highlights of this fine shaper. Send for the catalog with full details.

SEND FOR FREE CATALOG

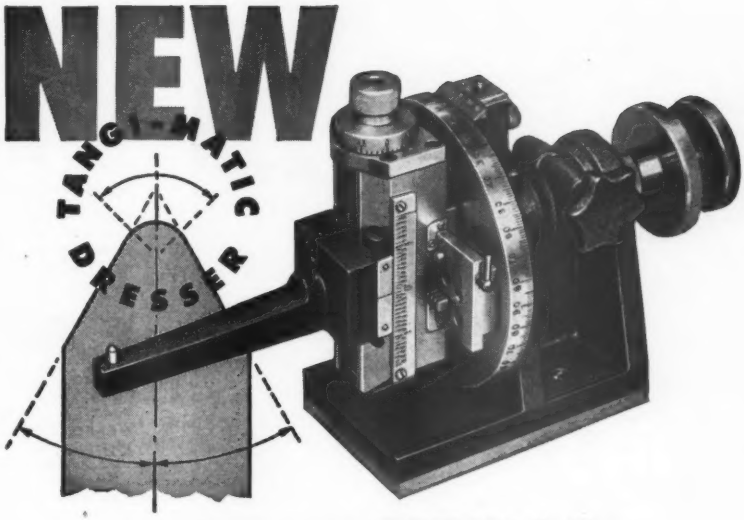
ATLAS PRESS COMPANY

718 NORTH PITCHER STREET

KALAMAZOO, MICHIGAN

Atlas DEPENDABLE QUALITY TOOLS SINCE 1911

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION



can save you HOURS daily

Now you can set up for dressing *any* grinding wheel form in *one-fourth the time*—and with precision to "tenths!" Our new TANGI-MATIC has a direct-reading micrometer *built in*—no "mikes," no height gage, no Jo Blocks—no errors. To dress any angle tangent to radius, you turn the micrometer dial and the vernier scale to "zero," adjust the diamond to the Master Gauge we furnish, then lock diamond with set screw. To obtain any radius down to .032", full 180°, you operate as a "mike," the feature which made our RADI-MATIC Radius Dresser famous.

The Perfex TANGI-MATIC is made by master gagemakers who specialize in gages and other precision instruments. All wearing parts are of steel, hardened, ground and lapped for a long life of precision service. The lead screw is hardened and ground to extremely close tolerances. Carrying case furnished for TANGI-MATIC and Master Setting Gage. Write for literature. And for all thread, plug and ring gage requirements, remember the Perfex reputation.

PERFEX GAGE & TOOL COMPANY

321 Avery Street • Mt. Clemens, Mich.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

MANY SIZES OF MILLING CUTTERS FOR INCREASED PRODUCTION

Our job is to improve the efficiency of your metal-cutting operations. Pratt & Whitney makes the standard or special milling cutters you need. Let P&W cutter engineering service help you to solve your milling problems. Contact the P&W Branch Office nearest you, see list below.

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice for Accuracy

MANNON OFFICES AND STOCK ... BIRMINGHAM • BOSTON • CHICAGO
CINCINNATI • CLEVELAND • DALLAS (The Stanco Co.) • DETROIT • LOS ANGELES
HOUSTON (The Stanco Co.) • NEW YORK • PHILADELPHIA • PITTSBURGH
ROCHESTER • SAN FRANCISCO • ST. LOUIS • SYRACUSE AREA: WEST MANCHESTER

CUTTING TOOLS • GAGES • MACHINE TOOLS

MANY TYPES

PRATT & WHITNEY PLAIN MILLING CUTTERS — sturdy construction for heavy duty work plus ample chip room.

PRATT & WHITNEY STAGGERED TOOTH T SLOT CUTTERS

PRATT & WHITNEY SPIRAL FLUTED KELLER CUTTERS—for duplicating and general die sinking work.

PRATT & WHITNEY MULTIPLE THREAD CUTTERS — for maximum economy on high production jobs.

PRATT & WHITNEY "HI-HELIX" END MILLS — high speed steel only—for general production end milling work.

. . . Machining, from page 72

hard on the right and a cast iron cutting grade on the left after turning the low carbon-iron-chromium titanium alloy. The tip on the right has removed 250 sq. in. compared to 65 sq. in. for the one on the left. The test was run at 150 sfm, 0.007-inch feed, and 0.060-inch depth of cut.

Figure 13 shows two superhard carbide tips which have machined titanium. The one on the left removed 470 sq. in. at 0.0035-inch feed and 0.015-inch depth of cut of the low carbon titanium alloy. The one on the right with the same speed and feed removed only 25 sq. in. of the high carbon titanium.

With such intensive research, Westinghouse now feels that titanium can be machined as readily as the 12 per cent chromium stainless steels which have been used for compressor discs. As an example of what combined research and development can do in solving a problem, the cooperation of the U. S. Broach Co. & Detroit Broach Companies with Westinghouse is notable.

In the beginning, two pass broaches were designed using 18-4-1 high speed steel. Some five or six slots were broached and size was lost. Some improvement was shown by going to 18-4-2 and 18-4-2 plus 5 per cent cobalt. By proper design and the present use of carbide-tipped broaches, titanium can now be handled in production schedules. However, the use of two-pass broach still has a major disadvantage due chiefly to the lack of rigidity in the broaching fixtures and in-

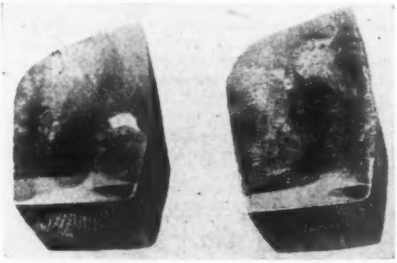


Fig. 12. Two different grades of carbide tips—super hard on the right and cast iron grade on left.

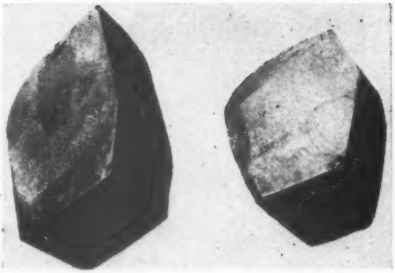


Fig. 13. Two super hard carbide tips which have machined titanium.

sufficient power in the broach. This lack of rigidity results in misalignment and movement of the disc. Use of a single pass overcomes this objection to some extent. To go to the single pass broach, machines of greater length and power are required.

Broach capacity is very limited today in light of present production requirements. Present broaches of the 72- and 90-inch capacity will not be adequate; the 120-inch will be required. Broaches must have greater rigidity of the bar, fixtures, and jigs. Increased attention will have to be paid to the affect of cutting design on the forces placed on the machine tool.

In closing, it is well to point out that, coupled with the sound machining practice which is required with the machine tools which have the necessary power and versatility, attention must be directed to the unusual or new approach to machining.

For instance, at Westinghouse we are investigating the use of carbon dioxide as a coolant in machining and the use of Gulf's Hi-Jet process. Other companies have considered the use of hot spot machining. New types of tooling have to be considered as well as new machine tools. The metallurgist is working full speed to make stronger and tougher alloys which will undoubtedly be more difficult to machine. Will our machine tools be able to keep pace with the new metallurgical developments? We believe that through cooperation with the machine tool builders this can be achieved.

"30 to 1," say users

Here's proof! Industry reports DIE-CO Die Springs are lasting up to **30 times longer than ordinary springs, in many troublesome applications.** On numerous press jobs, DIE-CO Springs' "more usable pressure" actually reduced the **number** of springs necessary. These all add up to **bigger savings!** Nearly 500 stock sizes available —a spring for every die. See what DIE-CO Springs can do for **you.** **Send for DIE-CO Spring Bulletin 1952-A.**

The DIE SUPPLY Co.

1400 Brookpark Rd. • Cleveland 9 • SHadyside 1-9000
915 Valley Street • Dayton 4 • MIchigan 9691
122 S. Sheridan Ave. • E. E. Pittsburgh 6 • EMerson 1-0463

DIE-CO

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

THIS "Verson" AUTOMATIC TOOL-UP

speeds production of large caliber projectiles

IN a tool-up developed by Verson and consisting of Verson presses and tooling, 90, 105 and 120 mm. projectiles are produced automatically from billet to finished forging. Production is increased 25% over previous methods; skilled manpower requirements are reduced substantially; material consumption is cut 15% resulting in big reductions in machining time. The tool-up incorporates conveyors for automatic handling between operations and automatic handling in the press.

This tool-up illustrates how Verson engineering can speed production and cut the cost of vitally needed defense materials. We will be pleased to send you additional information on this projectile tool-up or to discuss your needs with you. Write or phone, outlining the nature of your requirements.

Originators and Pioneers of Allsteel Stamping Press Construction

VERSON ALLSTEEL PRESS COMPANY

9335 South Kenwood Avenue, Chicago 19, Illinois So. Lamar at Ledbetter Dr., Dallas 15, Texas

A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING
DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

KOLB UPRIGHT DRILLS

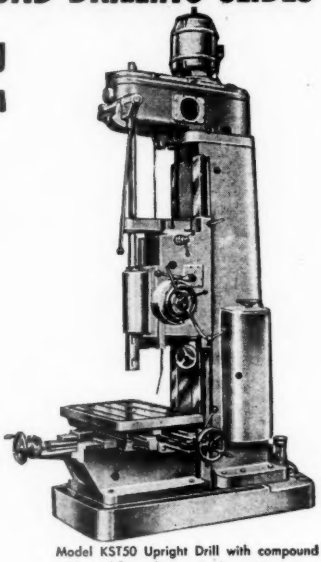
with COMPOUND DRILLING SLIDES

for Precision Drilling
High Production

Kolb Precision Upright Drills are rigidly constructed, amply powered and carefully engineered to provide maximum operating efficiency under severe and exacting production demands . . . The 12 spindle speeds, reversing and fast braking action of the spindle are clutch controlled and are all set by a single operating lever . . . The Compound Drilling Slide, made up of the base slide and spindle slide, moving on prismatic ways, permits wide and even distribution of the feed movement, and increases drilling depth. The feeds of the base and spindle slides can be set individually or together to suit specific job requirements . . .

To increase the versatility of the machine, Multiple Spindle Heads are easily mounted on the spindle head ways. For jig boring, a large compound table with micrometer screws is bolted to the base of the machine. Fine adjustments to tolerances of .0004" are made with gauge blocks and dial indicators.

Tell us about your drilling requirements. We will gladly recommend the proper Kolb Equipment for the job.



Model KST50 Upright Drill with compound table and fine adjustment micrometer screws.

Principal Specifications

	KST 50	KST 65	KST 80
Drilling Capacity in Cast Iron	2-1/2"	3-1/8"	4"
Drilling Capacity in Steel	2"	2-1/2"	3-1/8"
Maximum Travel of Spindle Slide	12"	16"	16"
Maximum Travel of Base Slide	16"	20"	20"
Distance between center of Spindle and Column	12"	15"	16"
No. of Spindle Speeds	12	12	12
Spindle Speeds, RPM	40-2100	35-1500	27-1030
No. of Feeds	6	12	12
Feed Ranges, IPR	.005 to .015	.0027 to .118	.0027 to .118
2 Speed Motor, HP	6.5	9	15
Net Weight	4400 lbs	6200 lbs	7200 lbs

COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools—from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

Send for Catalog and name of nearest Distributor

Want Something Special?

If you need *special sizes,* or have unusual drill bushing needs, give us the problem. Our competent staff engineers will promptly recommend the best size and type drill bushing for the job.

The entire effort of American Drill Bushing Company is directed toward producing *precision* drill jig bushings to meet your requirements.

Our exclusive distributors throughout the nation maintain complete stocks of standard types and sizes, for immediate delivery.

Call American if you want SOMETHING SPECIAL!

SPECIALIZING ONLY IN DRILL JIG BUSHINGS

American DRILL BUSHING CO.

5107 PACIFIC BOULEVARD, LOS ANGELES 58, CALIFORNIA

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

An Album of Duplicator Jobs

These several shop shots of interesting duplicator job setups are from material compiled for a Department of the Navy technical bulletin on Duplicators.

In the preliminary draft of the introduction to the bulletin, the Department of the Navy says, in part: "The most prominent characteristics of our labor market is the scarcity of men highly skilled in the mechanical trades employed by Naval Yards. * * * * the principal reason why there exists a shortage of highly skilled labor is the disproportionately high price paid to unskilled labor, or stated conversely, the disproportionately low price paid to the skilled labor. This

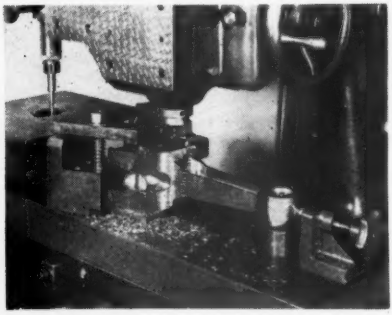
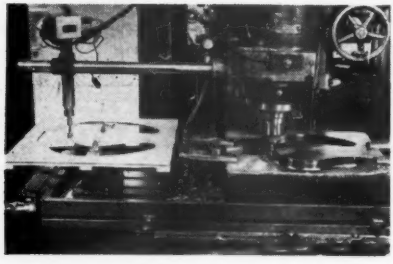


Fig. 2. The equipment shown in Figure 1 operation duplicating a pocket in a Pratt & Whitney aircraft engine master connecting rod. The tracer-template action coordinates the two hydraulic motors to automatically contour-mill the pocket.

Fig. 3. (below) A large vertical milling machine with tracer control contour milling a mold cavity for a plastic toilet seat.



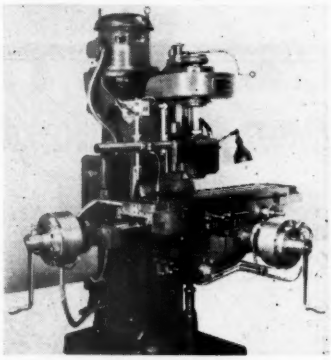


Fig. 1. This duplicator, attached to a small vertical milling machine has a hydraulic motor which actuates the cross feed screw, and another hydraulic motor powering the longitudinal feed screw. The electric tracer is positioned on a bracket bolted to the head casting. The feed screws are left intact hence the tracer does not interfere with conventional operation.

is a condition which is the result of a long term trend, and it is very questionable if it ever will be reversed. * * * * "

These remarks are by way of introduction to the idea that a part of the increasing "automation" of machine tools is the provision of easily set up and accurate copying devices which are now commercially available for all basic types of machine tools. These tracer attachments to machine tools permit unlimited repitition of the size, shoulder, and contour features of machined workpieces, copied accurately from either a master

(Continued on page 86)

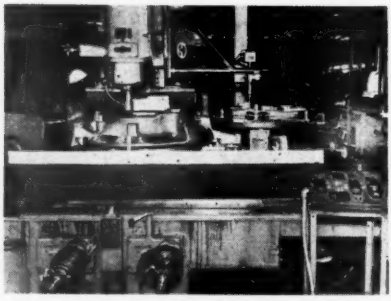


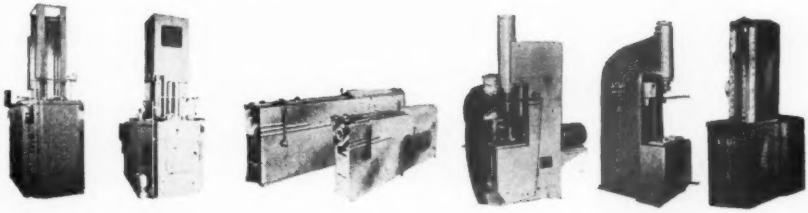
Fig. 3-A. This duplicator equipped vertical mill is shown machining seven different contours with one set-up on a tank cupola at Detroit Arsenal.

THE WORLD'S NEWEST

—AND FINEST—
LINE OF

BROACHING MACHINES

NOW OFFER
GREATER SAVINGS THAN EVER BEFORE!



SINCE 1946 we here at ACME have been engaged in creating a line of broaching equipment new from the floor up. Into these broaching machines has gone the best thinking of ACME personnel engaged in broaching machine and tool manufacture for over fifty years.

Because we have found it possible to simplify hydraulic circuits and to use component parts requiring less handling and machining time, original cost of these machine tools is competitive. By incorporating the features known to be desirable and developing new features we have found it possible to reduce broaching cost over previous broaching set-ups as well as other machining methods in case after case.

We invite you to avail yourself of the Lapointe Family "know how". There is, of course, no obligation.

ACME BROACH CORPORATION

BROACHING MACHINES
BROACHING TOOLS
BROACH FIXTURES
BROACH PULLERS

•

A complete Line

MILAN•MICHIGAN•U.S.A.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Our Best Salesman is Your Experience!

When you've once used a Darwin & Milner TOOL STEEL — followed the recommendation of our sales engineer and compared results over other steels — you're "hooked"! Over the many years we've served industry, and Darwin & Milner is one of the oldest names in the tool steel business, our customers' experience has been a big factor in our growth. If you would like a copy of the Darwin & Milner catalog, we'll be glad to see that you get one! We think it holds the answer to many tool steel problems.

PRK-33 Air Hardening, Non-Deforming Cobalt, High-Carbon, High Chrome. For high production blanking, forming, drawing, trimming and shearing.

NEOR The Original Oil Hardening, Non-Deforming High-Carbon, High Chrome. Recognized as the ideal lamination die steel. Also suitable for other long run dies.

MINEOR 5% Chrome, Air Hardening, Non-Deforming. Has many desirable features of more expensive air hardening steels. Tough at high hardness.

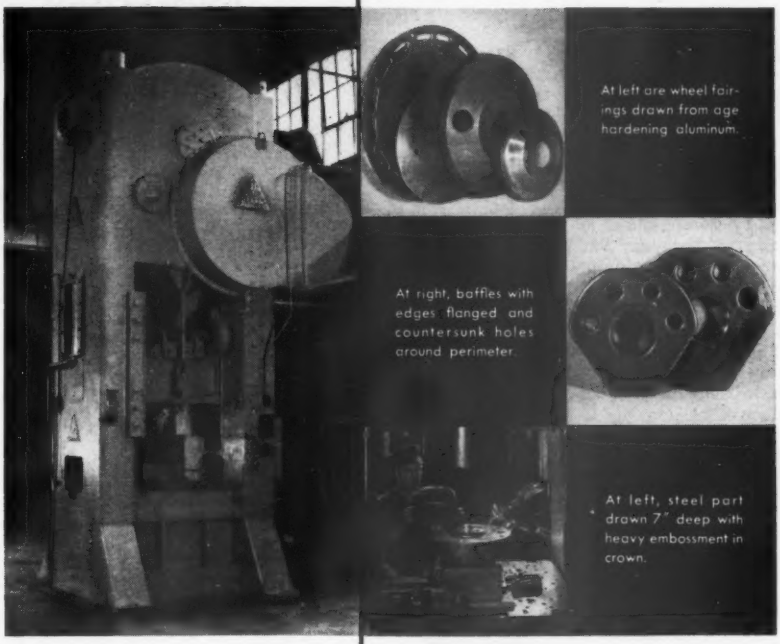
OHT Oil Hardening, Non-Deforming. Excellent machineability, minimum distortion, good resistance to wear. An economical steel for short run dies.

"MT6" The standard "M2 Type", High Speed Steel. Designed for a superior tool and at the same time save critical alloys.

➤ ➤ ➤ *Furnished in bar stock, billet, forging, sand casting. Bulletin on request.*

DARWIN & MILNER Inc.
highest grade tool steels
2345 ST. CLAIR AVENUE ★ CLEVELAND 14, OHIO

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION


At left are wheel fairings drawn from age hardening aluminum.
At right, baffles with edges flanged and countersunk holes around perimeter.
At left, steel part drawn 7" deep with heavy embossment in crown.

VARIETY SHOW

From 13 gauge to one-half inch plate . . . From hot rolled steel to age hardening aluminum . . . Whatever the task assigned to it, this Clearing 400 ton crankless press has been giving dependable service for more than ten years at Leake Stamping Company of Monroe, Michigan. Clearing presses are built to give dependable performance with low maintenance costs whatever the production requirements may be.

It's always a good idea to look to Clearing for help whenever your production problems involve the forming of metal.

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS

HAMILTON DIVISION, HAMILTON, OHIO

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

. . . Duplicator Jobs, from page 82

template or the first piece produced. The bulletin recognizes that "this latter development is the 'economic' answer to the shortage of skilled labor. It yields high productiveness at costs which are at a minimum in accordance with today's techniques."

The accompanying job illustrations are furnished through the courtesy of the Tracer Control Company, Hazel Park, Michigan, distributors of the duplicator equipment manufactured by the Lodge & Shipley Company of Cincinnati, Ohio.

The duplicators are dual in that they control two feeds of the machine tool simultaneously. One standard dual duplicator can be attached to almost any screw

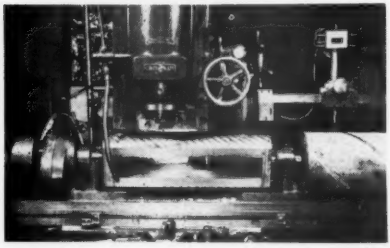
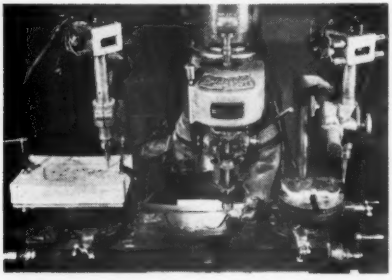


Fig. 4. Here is a rotary application of a dual duplicator. From the action of the tracer and master spiral shown at the right, one hydraulic motor provides the rotation of the fixture, and the other motor drives the longitudinal feed screw of the mill. The combined movements result in the spiral fluting of the workpiece.

Fig. 5. (below) The tracer on the right is a dual tracer controlling the cross and longitudinal feeds so that the cut reproduces the plan profile of the template. The tracer at the left controls the vertical knee screw, and as it passes over the plaster model it dictates the rise and fall of the table. This mold job was done automatically and within .001" of specification.



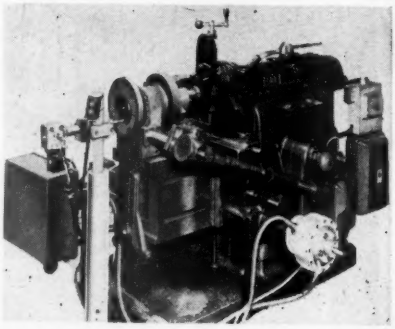
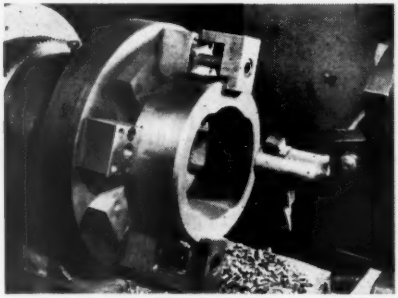


Fig. 6. Here is a most ingenious application of tracer control to the production of a ring cam requiring 360° internal contour shaping. The workpiece is mounted on a rotary fixture. The cam template is secured to the outer end of the fixture and rotates with the work. The indexing arm of the shaper rotates the fixture a preset amount after each stroke of the ram. The duplicator hydraulic motor actuates the vertical knee feed screw. As each stroke of the ram indexes the rotary fixture, the tracer "transmits" the next height setting and thus the varying cam radius is generated. Figure 7 (below) is a close-up of the work.



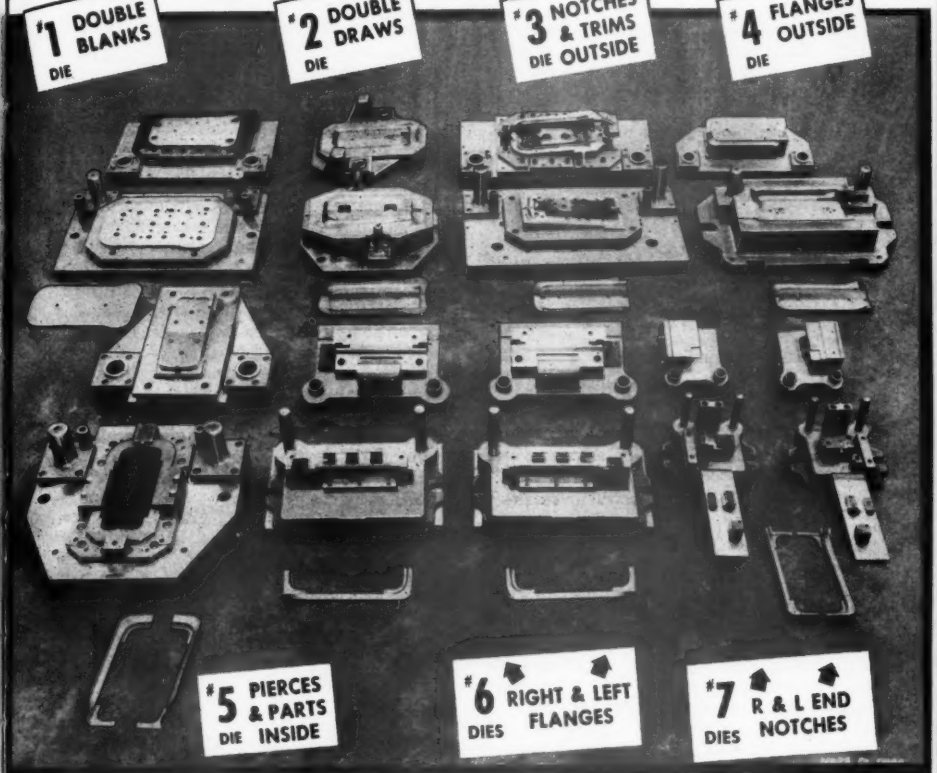
driven machne tool, it can automatically machine any contour in a single plane, it can be moved from one machine to another as the need arises.

A further requirement present in many instances is the need of using the machine tool in a conventional manner while the duplicator is attached to it. This is important because it gives the user full utilization of the conventional feeds of the machine tool when needed and also tracer control when needed.

Three or four dimensional duplicating can be accomplished in the same way.

SOLVED!

Auto maker solves heavy production problem with 7 BARTH DOOR PANEL DIES!


#1 DOUBLE BLANKS DIE
#2 DOUBLE DRAWS DIE
#3 NOTCHES & TRIMS DIE OUTSIDE
#4 FLANGES OUTSIDE DIE
#5 PIERCES & PARTS DIE INSIDE
#6 RIGHT & LEFT FLANGES DIES
#7 R & L END NOTCHES DIES

A PICTURE 'OFT IS WORTH A THOUSAND WORDS... and here again is evidence of how capably, dependably and skillfully Barth helps production men meet and beat the toughest, heavy run production schedules. This auto manufacturer's worries about his inner door panel production problem has been completely and profitably solved. Why not bring your tooling, die or special machinery problems to Barth? Write for catalogue.

BARTH

STAMPING & MACHINE WORKS, Inc.

12650 Brookpark Road, Cleveland 29, Ohio

. . . Marforming, from page 57

As it descends further, the magnitude of the pressure generated in the pad is determined by the amount of fluid escaping from the under side of the piston which is controlled by the adjusted contour of the strip cam. As the fluid escapes, the piston, pressure pins, and blank holder plate move downward exposing the punch. The compression of the rubber pad forces the blank to assume the contour of the punch and, simultaneously, clamps the blank between the blank holder plate and rubber pad, thus preventing the metal from wrinkling as the draw takes place.

When the draw is completed, the upper bolster automatically rises, releasing the

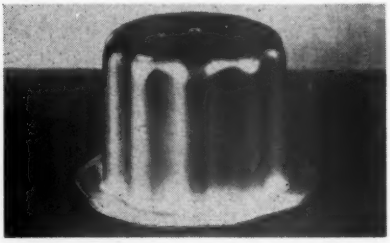


Fig. 6. Material 0.40", 2 SO aluminum, 2¾" dia., 2¼" deep. Press advance and return, 2" per second; pressing speed, 1/3" per second.

100 Pieces	Marform	Steel Draw Dies
Tooling Costs	$112.50	$504.00
Manufacturing Cost	8.26	9.40
Total Cost	$120.76	$513.40
10,000 Pieces		
Tooling Costs	$327.32	$609.00
Manufacturing Costs	249.00	482.00
Total Cost	$576.32	$1,091.00

pressure on the rubber pad and on the drawn part. The accumulator then supplies the necessary power to the hydraulic cylinder to strip the part from the punch as the piston, pressure pins and blank holder plate move upward.

Marform requires only a pressure plate and male punch; it eliminates the most costly part, the female die, as well as the time consuming problem of matching the punch and die. For single operation tooling, savings are well over 50%; and where the number of operations has been reduced, corresponding savings are much greater.

Reductions in tooling costs are considerable as substantiated in the cost analyses shown in Figures 4, 5, 6, and 7. These cost figures were based on a tooling labor charge of $3.91 and a manufacturing labor cost of $3.76 per hour.

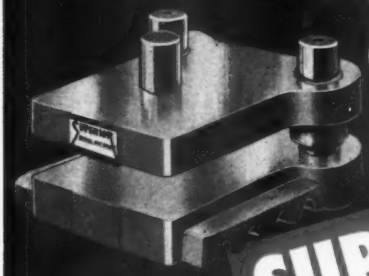
Fig. 7. Material 0.025", 24 SO aluminum, final condition full hard. Flange height ⅞", nose radius 1¾", open end ⅜" wide. Press advance and return, 2" per second; pressing speed, 1/3" per second.

100 Pieces	Marform	Steel Draw Dies
Tooling Costs	$168.08	$397.00
Manufacturing Costs	41.40	55.20
Total Costs	$209.48	$452.20
2,000 Pieces		
Tooling Costs	$168.08	$570.00
Manufacturing Costs	680.00	1,020.00
Total Costs	$848.08	$1,590.00

Marform versatility provides an economical means of tooling where frequent design changes are anticipated. Similar parts, requiring different material specifications and gauge sizes, can be successfully formed on the same tool simply by adjusting the pressure control mechanism. Furthermore, the forming stroke can be stopped at any desired position for inspection of the part, a feature which is invaluable in developing new shapes. In addition, parts of different depths may be drawn on the same tool.

Fig. 8. The wrinkled part at the bottom was made by the Guerin Process. The part at the top was Marformed in a single operation requiring no hand work whatsoever. The fact that this pressure is controlled at all times during the stroke prevents rapid application of stress at any point on the metal, regardless of the depth of the draw. This not only enables the part to be drawn deeper, but provides a part more satisfactory in applications where uniform thickness is important.

HERE'S WHY YOU CAN **Meet** URGENT DELIVERY SCHEDULES **Cut** DIE MAKING **Costs** WITH



SUPERIOR PRECISION ALL-STEEL **DIE SETS**

Yes, you can reduce die making costs! And complete work faster on urgently needed dies when you use Superior All-Steel Die Sets.

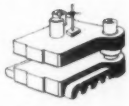
You can speed die production by using Superior die sets and relying upon Superior engineers to help determine your needs. Write, wire or phone now for helpful information —AND

FREE CATALOG—*descriptive of Superior Precision All-Steel Die Sets and Supplies will be sent without obligation. Please state name of company and your title.*

FOR FAST LOCAL SERVICE CALL THESE SUPERIOR REPRESENTATIVES

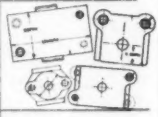
- Kalamazoo, Mich. — Phone 7988
- Indianapolis, Ind. — BRoadway 5668
- Chicago, Ill. — CEntral 6-3869
- Dallas, Tex. — Riverside 5138
- Syracuse, N. Y. — 2013 James St.
- Rockford, Ill. — Phone 33991
- St. Louis, Mo. — Lucas 1223
- Milwaukee — Mitchell 5-6027
- Dayton, Ohio — Hemlock 6209

1 **Precision workmanship** throughout — no time lost in modifying or altering sets to fit your needs.

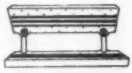


2 **Superior sets are easier to handle** — exclusive safety flange provides quick, safe gripping surface.

3 **Wide range of die set sizes** in standard and special models —extends die maker's ability to produce high quality dies faster and better.



4 **Pre-machining on punch and die holders available**—have Superior machine deep cavities, cut slots and drill holes prior to final grinding and jig boring. This service at moderate additional cost will relieve your facilities and cut overall die making time.



5 **Plus** — welded bosses around pins or bushings for maximum accuracy and extended life — shank location optional — reduced punch holder size where possible — and Superior's ability and experience in producing precision die set for the stamping industry.

SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

SAVE UP TO 76% PACKING TIME!

JIFFY INDUSTRIAL PADDED SHIPPING BAGS

are widely used for shipping of accessories, spare parts, machined parts, hand and machine tools, semi-fragile and non-fragile items. These ready-made, self contained shippers complete *entire* shipping operation in 2 simple steps.

INSERT ITEM

CLOSE BAG — either STAPLE or TAPE

Samples or anticipated orders can be packed in advance in JIFFY SHIPPING BAGS and kept in storage with absolute protection from dirt, dust and moisture. When shipments become due, pre-packed items can be shipped speedily as individual or multiple pack shipments—depending upon quantity.

JIFFY PADDED SHIPPING BAGS are easy and simple to use, economical, time and labor saving. Can be used for C.O.D. shipments or interior packing.

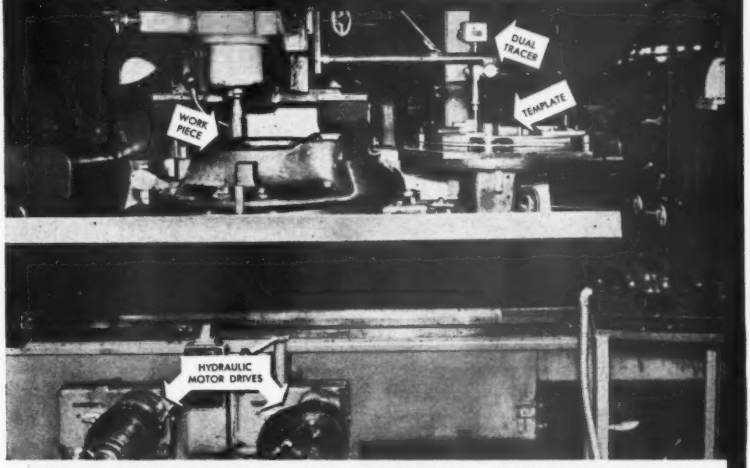
Available in 8 standard sizes

FREE SAMPLES ON REQUEST

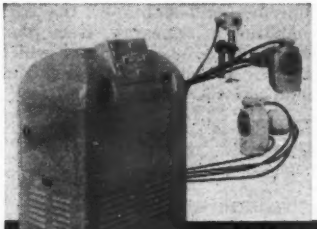
JIFFY MANUFACTURING COMPANY

360 FLORENCE AVENUE * HILLSIDE, NEW JERSEY

DUPLICATE MACHINED PROFILES and CONTOURS ON A PRODUCTION BASIS



PERFORM INTERNAL AND EXTERNAL CONTOUR WORK ON LATHE OR MILL... *at low cost!*



Original accuracy, normal cutting speeds, simple operation. (1) Controls two feeds simultaneously. (2) Does not interfere with conventional use of machine. (3) Applicable to most standard machine tools . . . This may be the answer for which you have searched . . . Write for our catalog.

90° shoulder and contour on lathe work

TRACER CONTROL CO.

Distributors for Lodge & Shipley Duplicator

595 E. 10 Mile Road • P. O. Box Q • Hazel Park, Mich.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

. . . Die Design, from page 49

off, that they could easily be replaced by grinding into the die block section and inserting a new piece.

A 2-pin center-post die set was used to help balance the die construction. The shedder in the die block in this case is actuated by a special upper spring bolster attachment, which pushes the blank back into the strip, eliminating the dropping of the part when being ejected which formerly caused nicks and damage to the part. The die shoe is mounted on 1-in. thick rails for piercing slug clearance, eliminating the necessity of drilling or making larger openings in the bolster plate of the press.

Figure 7 is another illustration of a compound die which was made for producing washers three at a time, using materials of various thicknesses. This die was made of air hardening tool steel and was run automatically. On the left side of the die is shown a scrap cutter which uses the bottom edge of the die block as a cutting edge, and eliminates the recoiling or rehandling of the scrap. Each blanking station has three knockout pins which are actuated by a T-shaped knockout through the shank of the punch holder.

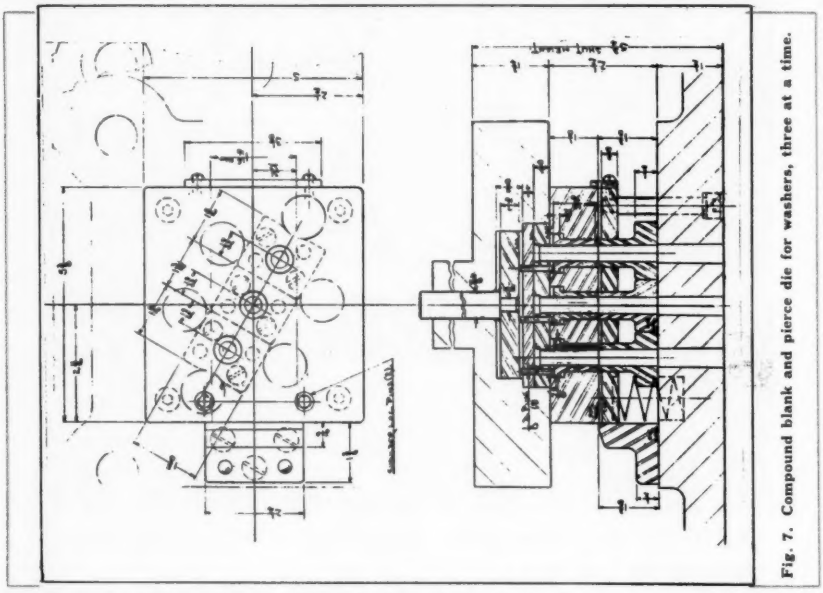


Fig. 7. Compound blank and pierce die for washers, three at a time.

"Strengthening America Through Standards"

is the title of a publication presenting the proceedings of the three-day Second National Standardization Conference, held in New York last October. It contains 21 addresses made at the Conference.

Among the subjects covered are: standards for engineering schools; industrial standards for defense production; electrical standards as an aid to purchasing; the operation of ASTM; railway research in standardization; the role of administrative standards in business and industry; the National Electrical Code; the National Plumbing Code; and materials conservation.

Also included is an extensive report on a successful research program carried out by the Porcelain Enamel Institute for reducing transportation breakage losses through pre-shipment tests.

Transcriptions of several question-and-answer discussion periods are reprinted.

The booklet is sold by the American Standards Association, 70 East 45 Street, New York 17, for $1.

How to get the most out of a 6" Grinding Wheel

Abrasive No. M34 Vertical Spindle Surface Grinder puts the full face of a 6" grinding wheel to work . . . gives maximum production on such jobs as facing flat dies, washers, punches, spacers, parallels, chasers, raising blocks, and production parts.

This grinder is unique. It's sized for the toolroom yet it's built for full-scale production. Abrasive No. M34 can take heavy cuts without deflection . . . produces finest surface finishes on every job.

• The single-piece bed and upright casting is strongly ribbed and well proportioned • The deep box-type table, while comparatively light in weight, is extremely rigid and well supported by a V-way and flat-way saddle • Easily modified by addition of circular grinding attachment for faster production of small parts • The 6" segmental type grinding wheel is direct-driven by a 5 HP, 3450 RPM motor — driving directly through a Pope-SKF spindle • Capacity: Longitudinal 24", transverse 8", vertical 12" • Net weight machine only, 3,000 lbs. • Feeds: Longitudinal power feed, transverse manual feed • Vertical feed automatic or by hand adjustment • Lubrication by central one-shot system

Write today for Bulletin describing Abrasive No. M34. Abrasive Machine Tool Co., 16 Dunellen Road, East Providence 14, R. I.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

Abrasive Quality Is Reflected in the Finish of Your Product

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

. . . CAN YOUR SURFACE G

"Our DoALL Grinder is 50% faster than previous machine and tool life is increased 30% because of better finish", says Reltool Corporation, Milwaukee, Wisconsin.

Rigid DoALL Surface Grinders Can Take Heavier Cuts and Produce Precision Work Faster

TRY THE TEST illustrated at the right. Take the heavy cut, reverse the crossfeed and let the wheel run back over the ground surface. If it sparks it is grinding again, showing that the wheel didn't take the full depth of cut on the first pass. If it is a DoALL Grinder it won't spark.

This demonstration proves the great rigidity of the DoALL Grinder, shows why it will do a given job in less time. You can take a heavier cut without "give" in the spindle or the table. The wheel doesn't climb over the work piece—it cuts true in one pass.

COOL GRINDING. With DoALL "Cool-Grinding"* you can take these heavier cuts without burning the work. Coolant flows in at the hub, *through* the wheel and out *at the point of contact* in a fine mist. There is always coolant where the heat is generated, unlike flood cooling where the wheel blasts the coolant away from point of contact.

There is a DoALL Surface Grinder for every tool-room or production requirement. Call your local DoALL Sales-Service Store today or write:

THE DoALL COMPANY
254 N. Laurel Ave., Des Plaines, Ill.
35 Local Sales-Service Stores in North America

*U. S. Patent No. 2470350

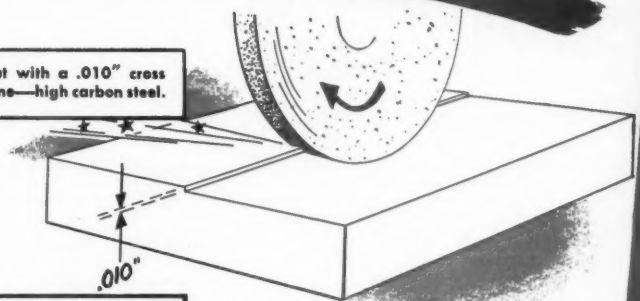
HERE'S WHY DoALL PRECISION HYDRAULIC SURFACE GRINDERS ARE FASTER, MORE RIGID, MORE ACCURATE!

MASSIVE FRAME—column support and base are single-piece chrome nickel steel casting, strongly ribbed for great rigidity.

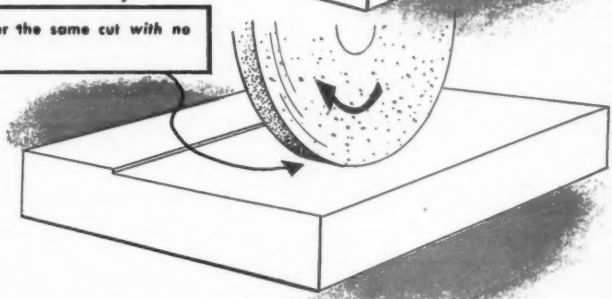
GR-65

GRINDERS DO THIS?

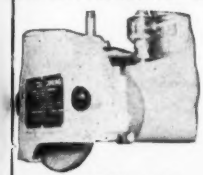
1. Take a .010" cut with a .010" cross feed in high chrome—high carbon steel.



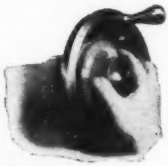
2. Run back over the same cut *with no spark out!*



You can see the above test as part of a complete demonstration of a DoALL Precision Surface Grinder right in your own plant, without cost or obligation. Call your local DoALL Sales-Service Store today.



HUSKY SPINDLE SUPPORT, dowelled and bolted to column, prevents wheel from chattering or springing away from work.

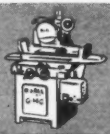


VERTICAL FEED IN INCREMENTS OF .0001" — made possible by rigidity and precision of extra-long 30" column.

Ask for Descriptive Catalog

DoALL

TOOLROOM GRINDER



CRUSH GRINDER

GAGING EQUIPMENT

MONOLITE

MOBILE INSPECTION UNITS

TOOL STEEL

SAY "GOODBYE"

TO BIG PROBLEMS WITH SMALL PARTS

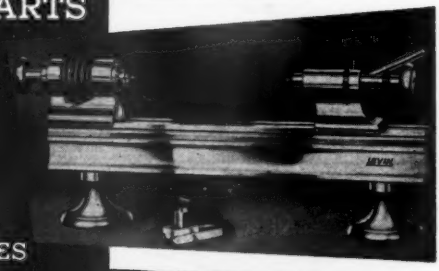
INVESTIGATE

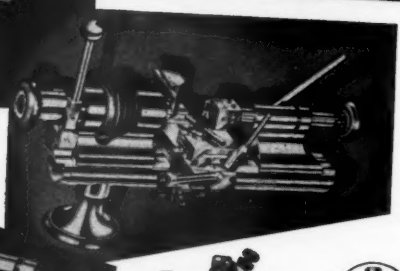
LEVIN®

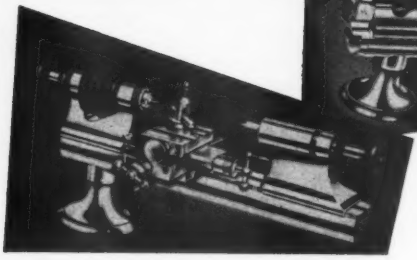
PRECISION
JEWELER'S LATHES,
ACCESSORIES AND
MICRO-DRILL PRESSES

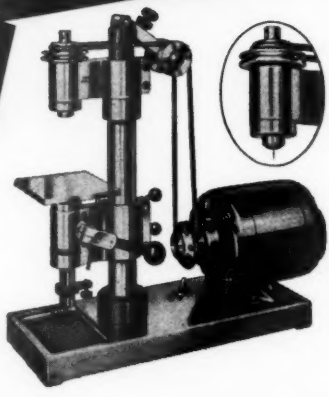
SEND FOR
COMPLETE CATALOG

Ideal for second operations or experimental work on small instrument parts where sensitivity is required. Releases expensive, larger lathes for more suitable work. Full line of accessories available.









An extremely sensitive drill press for very small drills down to .002". Drills held in accurate collets to minimize deviation. Spindle run-out less than .0001". Finger tip control enables operator to feel progress of drill.

LOUIS LEVIN & SON, INC.
782 E. Pico Blvd., Los Angeles 21

BOYAR-SCHULTZ

Tool Room Grinders

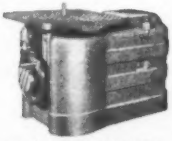
● Wherever Boyar-Schultz Grinders have been intalled, their design, quality of materials and unexcelled workmanship are quickly recognized. ¶ In shops where accurate, close tolerance work is necessary, skilled mechanics turn instinctively to Boyar-Schultz Grinders, knowing that these tools give fullest expression to their ability. ¶ With Boyar-Schultz Grinders in your shop or tool room, you are sure you have the best your tool dollar can buy.

Write for circulars.

No. 6-12 SURFACE GRINDER
LARGE Machine Performance
Small Machine Cost!

No. 2 PROFILE GRINDER With Dual or Single Spindles

No. 6-18 SURFACE GRINDER



No. 1 PROFILE GRINDER

BOYAR-SCHULTZ CORPORATION
2112 WALNUT STREET, CHICAGO 12, ILLINOIS

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Save 15 Minutes

OUT OF EVERY 60 IN DIE ASSEMBLY

THEY'RE PRE-LOADED

specify

LEMPCO DIE SETS

Perfect alignment on every try

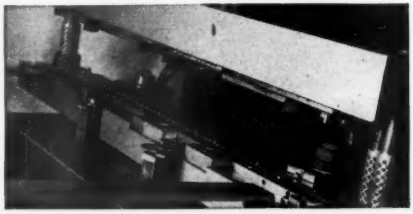
When you place dies mounted with Lempco Die Sets in a press you can forget about maintenance. Such mishaps as frozen bushings, scored pins, pulled shanks or die damage just don't happen. More pieces per grind, less down time, close more accurately, produce pieces with cleaner edges and less scrap. For literature, write to Lempco Products, Inc. (Industrial Division), Bedford, O.

No pry bars, lead hammers or die pullers necessary!

Perfect alignment on every try

Forget LUBRICATION TROUBLES

When you specify LEMPCO DIE SETS



LEMPCO

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

5 Spots Drilled Simultaneously In a Brass Ball

THIS machine incorporates our Model KH Govro-Nelson Drilling Units mounted horizontally to drill four spots of .140" diameter—also one Unit mounted vertically, drilling up from the bottom a .154" diameter hole in a small brass ball.

The operator loads the part manually. After the drilling operation, the manual unclamping automatically ejects the part into the chute.

With this set-up, the 5 operations are completed at a rate of one part each 4 seconds, including loading and unloading time.

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

WRITE FOR *Literature*

GOVRO-NELSON CO.

Machinists of Precision Parts for 28 Years

1933 ANTOINETTE
DETROIT 8, MICHIGAN

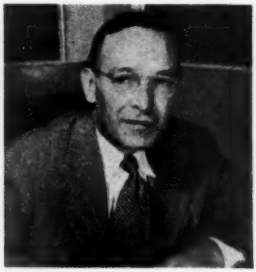
Automatic **DRILLING UNIT**

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

MEN YOU SHOULD KNOW . . . . . .

F. J. DE LORME

F. H. BISHOP



BENNETT D. JONES

★

F. J. de Lorme has been appointed secretary and assistant treasurer of the E. W. Bliss Company. Mr. de Lorme, who is 42 years old, is a New York attorney and accountant, and joined the Bliss organization in 1950 as division controller. He was formerly secretary, treasurer, and director of a New England textile manufacturer.

★

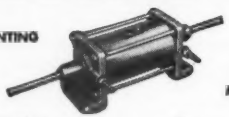
Frank H. Bishop has been elected president of the Allied Products Corporation. Mr. Bishop is also a director, and joined Allied Products in 1949. Before that he had been with the General Electric Corporation for twenty-two years. During the war he served with advisory committees for the War Production Board.

★

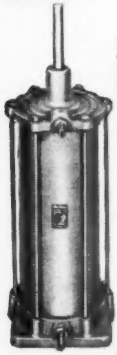
Bennett D. Jones, metallurgist at the Standard Pressed Steel Company, Jenkintown, Pa., since 1944, has been made manager of product development, a post newly created to speed the development of new products. He has been with the Standard Pressed Steel Company since 1934, and will be succeeded as metallurgist by R. L. Sproat.

★

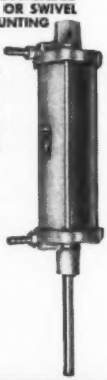
DOUBLE-ACTION AIR CYLINDERS



VERTICAL MOUNTING



SUSPENDED OR SWIVEL MOUNTING



Mounting	Bore				
Horizontal	1½"	2¼"	3"	4"	5"
Vertical	1½"	2¼"	3"	4"	5"
Face	1½"	2¼"	3"	4"	5"
Swivel	1½"	2¼"	3"	4"	5"

Length of stroke optional

The new Mead Air Power Catalog shows the full line of single and double-acting cylinders, and air-operated Presses, Vises, Chucks, Hammers, Work Feeders—for faster, money-saving production. Write today!

MEAD SPECIALTIES COMPANY

4114 No. Knox Ave., Dept. HA-72, Chicago 41, Ill.

. . . . . MEN YOU SHOULD KNOW

E. J. KLONOWSKI

ROBERT OEHLER

H. E. ROBISON

★

Edmund J. Klonowski has been appointed sales manager of the Punch Division of the Pivot Punch and Die Corporation of North Tonawanda, N. Y. Mr. Klonowski is 34 years of age, and has been affiliated with the Pivot Punch and Die Corporation since 1947. He was previously associated with the Struthers-Wells, Wales-Strippit, and Bell Aircraft Corporations.

★

Robert Oehler has been appointed Chicago district sales engineering manager for Anker-Holth, division of the Wellman Engineering Co. His office will be at 320 N. Michigan Ave., Chicago, Ill. He will provide engineering service in the application of cylinder power for designers and plant engineers in northern Illinois and Indiana. Anker-Holth manufactures pneumatic and hydraulic cylinders, chucks, collets, and air-valves.

★

The Industrial Diamond Association of America has elected Mr. Harold E. Robison as its president for the year 1952-3. Mr. Robison previously held various executive offices within the Association, which recently met in Bermuda for its 7th Annual Convention.

★

FOR PRECISION
Carbide Finishing
ELGIN DIAMOND
IN DYMO-C
...Designed for Carbides!
Where precision really counts, finishers specify ELGIN Diamond because they can be sure of:
• consistant accuracy—uniform cutting action
• flawless finishes every time, in less time
Actual field tests prove this new diamond abrasive up to 20% faster for finishing carbides.
Send for the DYMO-C bulletin today!
ABRASIVES DIVISION, Dept. B
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS
ELGINS
DYMO-C

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

MEN YOU SHOULD KNOW.....

B. WALTER SWANSON

W. M. HANNEMAN

J. H. BIGGS

★

B. Walter Swanson has been appointed factory manager by Hanson-Whitney Company, manufacturers of precision threading tools and gages. Mr. Swanson previously was New England manager of sales and service. Mr. E. P. Cody has been appointed office manager, in addition to his duties as general sales manager.

★

Walter M. Hanneman has been appointed executive engineer directing standard product engineering of the Shakeproof Inc. division of Illinois Tool Works. His offices will be located at Shakeproof's St. Charles Rd. plant in Elgin, Ill., and his appointment will assure a more complete engineering service to customers. Shakeproof standard products include the well-known toothed lock washer line, thread-cutting screws and pre-assembled fastener units.

★

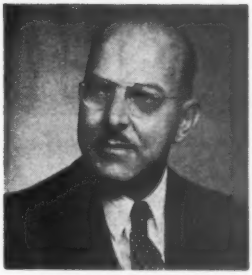
John H. Biggs, formerly representative of the Brown & Sharpe Manufacturing Company in Philadelphia, has been appointed a representative of Brown & Sharpe of New York, Incorporated. He succeeds Mr. J. H. Skelton, retired, and will assume charge of the New York office.

★

VISUAL GRIND
Now a Veteran...
Tested, Proven Successful—
IN MANY PRODUCTION PLANTS!
Continuous inspection unites with blind, straight-through and templet grinding by projection during the grinding period. This complete speedy machine handles a wider range of work than ever before. Difficult jobs in steel and tungsten carbide which required several machines are dispatched with ease and profit on Visual-Grind. Tolerances and accuracy are progressively controlled by visual reference. A precision optic system gives trueness and definition. Husky construction insures rigidity and long life.
Ask for Bulletin No. T-7.
VISUAL GRIND
THE CLEVELAND GRINDING MACHINE CO.
1643 EDDY ROAD - CLEVELAND 12, OHIO

. . . . . MEN YOU SHOULD KNOW

J. M. ROBERTSON



WALLACE L. HOWE

RAYMOND J. ZALE

★

James M. Robertson, who has been associated with the Wellman Bronze & Aluminum Company for the last decade, has been appointed chief chemist in charge of quality control at all plants. A graduate of Wittenberg College, he did post-graduate work at Western Reserve University.

★

Wallace L. Howe has been appointed director of research and development at Norton Company. Mr. Howe was formerly director of development, and now heads the activities of both departments. Mr. Howe has been associated with Norton Company for 29 years, and before his new appointment, had successively held the positions of product engineer and director of product engineering.

★

Raymond J. Zale has been appointed sales metallurgist for the Firth Sterling Steel & Carbide Corporation. He was formerly employed by the Lindberg Steel Treating Co. as plant metallurgist and assistant plant manager of their Rochester division, and as New York state sales representative for Darwin & Milner, Incorporated.

★

STRAIGHTEN COIL STOCK
FOR PRESSES, SHEARS OR SLITTERS

WITH
LITTELL Variable Speed STRAIGHTENING MACHINES

Output rises, costs drop when coil stock is fed to the press, the shear, or the slitter through a Littell Straightening Machine. Coil stock comes out of a Littell Straightener flat, with curvature removed. Equipped with variable speed transmissions, Littell Straighteners are easily adjusted to meet a wide range of speed requirements. Thirteen medium and heavy duty models straighten coil stock of all standard widths and thickness.

F. J. LITTELL MACHINE CO.

WRITE FOR CATALOG

ROLL FEEDS • DIAL FEEDS • STRAIGHTENING MACHINES • REELS • AIR BLAST VALVES

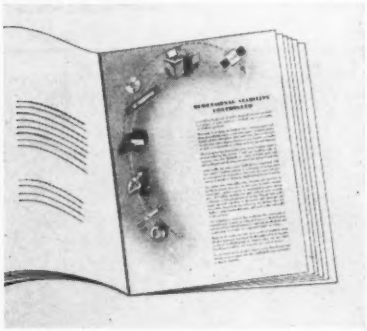
District Offices: Detroit, Cleveland

4197 N. RAVENSWOOD AVE. • CHICAGO 13, ILL.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Circle postage-free Inform-A-Gram Key Number for your request.

"Dimensional Control and Gaging Policy" is the title of an attractive 38-page brochure published by the Sheffield Corporation of Dayton 1, Ohio. It covers such subjects as gaging policy, tolerances, reference tempera-



ture, gage specifications, ordnance practices, fixed gages, instruments, and multiple semi-automatic and automatic gaging devices. The booklet contains in addition many useful charts and illustrations, and is an extremely valuable shop aid.
Circle Inform-A-Gram No. C1.

A 200 Page Tool Steel Handbook has been newly published by the Allegheny Ludlum Steel Corporation. The book starts out with charts and tables giving specific and comparative data on tool steel properties, analyses and applications. This is followed by detailed descriptions of all important grades, arranged alphabetically for easy reference. The next chapters describe the many forms and finishes available from Allegheny Ludlum, and certain allied products such as Carmet carbides. The final sections comprise an extensive discussion of heat-treating and handling techniques as applied to tool and high speed steels, and a complete set of weight tables and other useful reference material. A comprehensive table of contents and a detailed index round out the usefulness of the volume. Write to the Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania, for your copy.
Circle Inform-A-Gram No. C2.

Representative Designs of Fluid Power Circuits are explained in a down-to-earth manner in a 30 page, pocket size booklet from the Logansport Machine Company, Inc., Logansport, Ind. The many possibilities afforded by the use of different type circuits are shown, and the booklet cannot fail to be of interest to anyone

responsible for increasing machine and man productivity. Tables of J.I.C. standard symbols, together with circuit diagrams, are included.
Circle Inform-A-Gram No. C3.

Warner & Swasey 5-Spindle Automatics, both bar and chucking machines, are covered in a comprehensive instruction manual, to be had for $2.50 by writing the company at 5701 Carnegie Avenue, Cleveland 3, Ohio. The manual contains 234 pages, and analyses a wide variety of subjects under the general headings of machine construction, installation, attachments, tooling, and operation. It is profusely illustrated with photographs, diagrams, charts and tables, and is designed to put the attentive reader on as intimate a basis with Warner & Swasey automatics and production potentialities as the engineers who created the machine.

A "Design Manual for the Repair of Aluminum Alloy Structures", with particular emphasis on aircraft construction, has been newly prepared by Johnson Research Corp., Bethpage, Long Island, N. Y. It is priced at $3.50 and contains a total of 208 pages. Practically every repair that would ever have to be made on an aluminum alloy structure is detailed, accurately designed and stress analysed. Sections include materials, processes, heat treats and finishes.

Type PAV

Prompt Delivery!

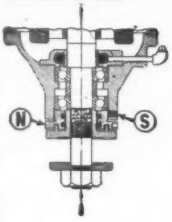
CUTS COSTS!

VERTICAL SPINDLE GRINDER

MAKE YOUR MACHINES "DOUBLE PURPOSE" MACHINES!

The Standard Verticle Spindle Grinder is made in sizes from ½ H.P. to 25 H.P. Speeds of 1200, 1800 or 3600 R.P.M. for cup or plate mounted cylinder type of wheel. **Ideal for application to Planers, Boring Mills, Shapers, Milling Machines, etc.** With or without feeds.

This sectional view illustrates a creation of Standard's engineers — evidence that you receive more when you buy a Standard tool. Sectional view of thrust bearing construction on all Standard modern Vertical Spindle and Double End Disc Grinders.



Threaded Nut "N" permits fractional thousandths adjustment by releasing Set Screw "S" to take up wear on bearings without removing wheel—no shims involved.

WRITE FOR CATALOG 44 TODAY

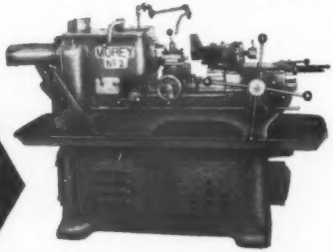
The Standard Electrical Tool Co. Mt. Hope & Sixth St., Cincinnati 4, O.

For Ease, Economy and Simplicity of Operation

DEPEND ON THE

MOREY No. 2 TURRET LATHE

Designed to take full advantage of tungsten carbide tools, the modern MOREY Turret Lathes are ruggedly and heavily built for continuous duty, maintaining close tolerances. New methods of speed and feed control are incorporated, permitting even the inexperienced operator to select almost instantaneously the speed and feed best suited to the work . . . ideal for both bar and chucking operations.



• NOW AVAILABLE FOR PROMPT DELIVERY WITH PRIORITY!

PARTIAL LISTING OF SPECIFICATIONS:

Bar work capacity	1" dia. x 6"
Chucking capacity	8" dia.
Swing over bed	14"
Hole through spindle	1-9/32"
Spindle speeds (Back gear ratio). 60-2000 RPM Inf. variations with constant speed, AC 1800 RPM motor 1.5.8	
Motor	3 HP

You need the MOREY for your production! Write us today for complete details.

MOREY MACHINERY CO., INC.

Manufacturers • Merchants • Distributors

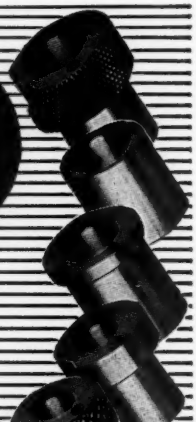
410 BROOME STREET • NEW YORK 13, NEW YORK

TELEPHONE: CANAL 6-7400 • CABLE ADDRESS: WOODWORK, N. Y.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

YOUR
"SPECIAL BUSHINGS"
May Be Our Regular
STOCK ITEMS!

Ready for Immediate Delivery
TWO complete bushing standards, the A.S.A. Standard plus our own Acme Standard, enables you to obtain bushings from stock that might otherwise require special manufacture. Results in faster delivery, lower cost. Write for catalog.



Accurate
Interchangeable
Concentric

Acme Industrial Company
Makers of Hardened and Ground Precision Parts
206 N. Laflin Street — Chicago 7, Illinois

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

KUTMORE ADJUSTABLE HOLLOW MILLS

ENGINEERED FOR . . .
PRECISION PRODUCTION

- ANY COMBINATION OF . . . TURNING . . . TAPERING . . . FACING . . . CHAMFERING . . . TREPANNING IN **ONE PASS.**
- EXCLUSIVE **MICROMETER** ADJUSTMENT FEATURE FOR RAPID SET-UP.
- CUTTING CAPACITIES FROM 1/32" TO 2" DIAMETER IN STANDARD STOCK.

WRITE FOR CATALOGUE No. 20TD

OUR ENGINEERING DEPARTMENT IS AT YOUR DISPOSAL ON YOUR HOLLOW MILL PROBLEMS

CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO. ROCHESTER 5, N. Y.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

A Complete Maintenance Service for Electrical Equipment is described in booklet B-4766 from the Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pa. The booklet presents a sound maintenance program based on the use of genuine renewal parts, repair service plants, and engineering and field service. Dozens of photographs show the special skill, testing devices, and repair equipment which are available to customers through strategically located repair plants. Many improved design renewal parts are illustrated. Motor exchange service, periodic inspection service, and "on the spot" repairs by field engineers are also described.
Circle Inform-A-Gram No. C4.

"One of the Most Troublesome Features of the Welding Process is the danger of cracks . . . " That is the beginning of a paper "Preheating for Welding" by Arthur B. Tesman, which appeared in the April 1952 issue of the Welding Journal and is now offered in reprinted form by the Tempil Corporation, 11 West 25th Street, New York 1, New York. The paper is both interesting and valuable, and contains a great deal of metallurgical knowledge in distilled form. It includes a table of recommended preheat temperatures for different metals and alloys, and a diagram illustrating the effects on steel structures of the temperature changes that accompany the welding operation.
Circle Inform-A-Gram No. C5.

Fulflo Mechanical Data Book provides complete selection, application, and installation data for a complete line of by-pass piston type oil relief valves, centrifugal coolant pumps, and high speed gear pumps. Various graphs are included, as well as installation diagrams that show essential specifications for correct installation and operation of each unit. THE FULFLO SPECIALTIES CO., INC., Blanchester, Ohio.
Circle Inform-A-Gram No. B6.

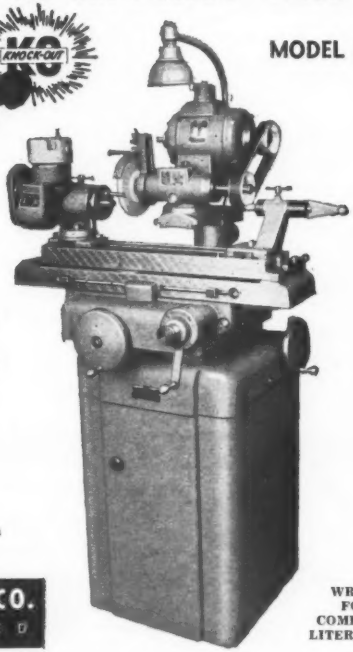
An Informative "Operating Instruction Manual for Automatic Setting Machines" has just been prepared by the Milford Rivet & Machine Co., Milford, Conn. Detailed information on the care and operation of automatic rivet-setting equipment, the operation and adjustment of the Horton non-repeat clutch, and the care and operation of automatic spot setting equipment is contained in the manual. Write for your copy of manual 352 to the Machine & Parts Department, the Milford Rivet & Machine Company, Milford, Connecticut.
Circle Inform-A-Gram No. C7.

A New Steel Castings Specification Chart has been compiled. As a reference aid to designers and purchasing department engineering staffs, the newly prepared chart covers pertinent data on virtually all general engineering types of steel castings, and recently adopted and revised specification standards. Information includes types of heat treatment, chemical compositions and mechanical properties, and ready reference data on test procedures. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15.
Circle Inform-A-Gram No. C8.

There's a reason 71%

of all popularly-priced Tool and Cutter Grinders sold in 1951 were "Knock-Outs"

MODEL B860



Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

Distributed Only Through Franchise Dealers

K. O. LEE CO.
ABERDEEN, S. D.

WRITE FOR COMPLETE LITERATURE

Metal Heat Specifications for Ceramic Coating

Recent applications of ceramic-coated metals in jet airplane engines has prompted the Barrows Porcelain Enamel Company, Cincinnati, to prepare a guide to the use of metals suitable for ceramic coatings in industrial installations.

The guide affords a convenient method of determining metal specifications according to heat resisting properties. No attempt was made to evaluate physical properties at high temperatures. Therefore, the temperatures suggested are based on heat resisting properties only.

By following the suggested maximum temperatures listed in the guide, intergranular corrosion and rupture or failure due to fatigue strains at high temperatures can be avoided.

This summary of maximum temperatures is based principally on tests running 150 to 200 hours. Therefore, it cannot be categorically applied to more extended time applications.

Metal or Alloy	Maximum Temperature
1010 steel	900° F
NAX series steels	1000° F
4340 steel	1100° F
430 chrome steel	1100° F
Timken steel	1300-1400° F
347 stainless steel	1700° F
304 stainless steel	1700° F
309 stainless steel	2000° F
310 stainless steel	2100° F
314 stainless steel	2100° F
446 stainless steel	2000° F
Inconel "C"	1800° F
Inconel "W" (Heat treated)	1500° F

Constant heat application was made during the tests, and it is suggested that, if heat application is intermittent, the maximum temperatures listed should be reduced approximately 100° F.

Welding introduces additional considerations. To be on the safe side, only #321 or #347 should be used when welding is to be done on the stainless steels. Both #321 and #347 are stabilized alloys. They can be used interchangeably. If a non-stabilized stainless steel is welded, high temperatures may cause failure at the weld area under certain conditions.

Certain physical properties affected by high temperatures should be noted here. Inasmuch as hardenability of certain of the metals and alloys used in the tests is materially affected by temperature applications such as might occur during application of ceramic coatings or in high temperature use, that factor should be observed when considering base metals or alloys to be used for ceramic coatings.

In general, the 300 series stainless steels—the chrome-nickel series—of the Austenitic group are hardenable only by cold working. Therefore, hardenability is not affected by subsequent temperature applications such as might occur during application of ceramic coatings or in high temperature use in burner and exhaust systems.

However, application of heat can affect the grain struction of Chrome Martenistic group of the 400 series stainless steels. These steels are age hardenable, and may fail under high temperatures.

It should be noted that the chrome ferretic steels (405, 430, 442, and 446) are not hardenable.

MICRO MINIATURES
MICRO MINIATURES
Will Help You Solve Your Small END MILL Problems
We specialize in sizes from .1875 down to ?
PRECISION GROUND FROM SOLID
WRITE FOR CATALOG
• POLISHED FLUTES
• FASTER CUTTING
• LONG LIFE
• STRENGTH
WOODSON TOOL CO., INC. • 4811½ Lennox Blvd., Inglewood, Calif.

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

Porcelain Enamel Institute Opens Door to New Members

The Porcelain Enamel Institute has opened its doors to new membership with three distinct types of manufacturers eligible to become active members. They are 1) "captive" porcelain enameling plants (manufacturers of stoves, refrigerators and other porcelain enameled products who have their own enameling facilities; 2) suppliers to the industry, including those allied with frit manufacturers; and, 3) independent porcelain enameling companies engaged in enameling the products or components of other manufacturers.

Government Procurement Manual

Secretary of Commerce Charles Sawyer has announced the issuance by the Department of Commerce of a revised edition of the Government Procurement Manual which the Secretary described as "the only source of information in the federal government covering the procurement activities of all major military and civilian agencies".

The Manual, lists 5,000 items and classes of items for which federal agencies are in the market. It contains a military agency and a civilian agency index together with a listing of the locations of the appropriate procurement offices.

DE-STA-CO Toggle Clamps speed production on this simple, efficient wood turntable fixture for volume cementing of plastic fish-net floats. Twenty-four Model 210-U clamps are used to obtain quick clamping pressure. The rugged construction of De-Sta-Co clamps has permitted continuous use for over 2½ years producing 240 to 300 floats per hour. Completely retractable, they permit easy insertion and removal of work. De-Sta-Co's positive clamping pressure on the float parts makes a perfect bond and accurate assembly.

Select from over 40 models of De-Sta-Co Toggle Clamps for your work-holding problems in assembly, welding, bonding, machining or inspection of any materials. Positive holding pressures up to 4000 pounds.

Write today for your copy of the De-Sta-Co Toggle Clamp Catalog describing more than 45 stationary and portable types.

DESTACO **DETROIT STAMPING COMPANY**

344 Midland Ave. • Detroit 3, Mich.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Air Material Command Explains Decentralization

Since its decentralization program was first announced by Air Material Command Headquarters at Wright-Patterson Air Force Base, near Dayton, Ohio, there has been much speculation as to the reasons for the program.

Although the reasons were clearly explained on March 29 of this year, some organizations and individuals insisted there were other reasons which actually had no basis in fact. In order to clear up the confusion in the minds of those who are or may be affected by decentralization, Lt. Gen. Edwin W. Rawlings, commanding general of AMC, has reiterated those reasons in a clear and positive statement. He said that decentralization would provide for: (1) increased efficiency; (2) greater economy; (3) more security; (4) room for future expansion, and (5) stronger planning and management control functions.

The first two points, efficiency and economy, are so closely related that to speak of one is to speak of the other. The decentralization planners know that increased efficiency will result from the program, but the actual savings in dollars and cents, are impossible to measure before the program starts.

In reality, the program is a further adaptation of private industrial methods of administration. AMC's operations have been compared with industry and the parallel is striking.

Any large industrial firm, for instance, has its home office, its field purchasing agent, the jobber or wholesaler, the retailer and finally the consumer or ultimate user. Under the present system, Wright-Patterson AFB is the site of AMC's "home office" and "field purchasing agent." The depots are comparable to the jobbers, the individual bases can be compared to the retailers and the using organization (combat or training units) are comparable to the consumer in civilian life.

Decentralization, in one respect, follows industry in placing in the field purchasing agents in other locations. Thus the prime depot assumes complete responsibility for certain items, including requirements, computation, distribution, receiving, storing and shipping.

The Supply Division has been using the two-zone system, whereby a depot in the western half of the country stocks the same items as a base in the eastern half. One of the two thus becomes the prime depot and the other becomes the zonal depot for a particular item.

MACHINE TOOL SHORTAGE?

. . . Get more production per machine through surface roughness measurement. Fantastic? No! Consider:

• DOUGLAS AIRCRAFT CO. (shown above) boosted production over 50% on a milling operation

• INTERSTATE ENGINEERING CORP. cut honing time on air cylinders by 50%

—simply by measuring microinch roughness in the shop with the Profilometer, and seeing that the parts produced are NO SMOOTHER THAN REQUIRED.

Chances are, *you* can gain machining-capacity the same way—get more production per machine. Investigate!

The Profilometer frees machine-time in other ways too. BULLETIN L-10 tells how. Write today!

Profilometer is a registered trade name.

MICROMETRICAL MANUFACTURING CO.
FORMERLY PHYSICISTS RESEARCH COMPANY
345 S. MAIN ST. ANN ARBOR 15, MICHIGAN

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

This system has been used by private industry for many years. AMC planners could assume that the efficiency of that type of operation had been proven conclusively.

Industry has shown, with many examples, that valuable benefits are to be derived from such a system.

With prime responsibility centered at one depot, the complete story on a particular article could be obtained at one source. At present, questions must be addressed to Headquarters, which in turn might have to go to the depot concerned for the answer.

Savings in time and money by elimination of many letters and telegrams are almost inestimable. Under the program, all queries from suppliers or using organizations would be directed to the depot with responsibility for the item.

Other paper work would be saved by centering all personnel concerned with the item at the depot. Thus, supply and maintenance personnel would be able to work out individual problems personally or with a local telephone call. Now a depot problem in supply is referred to Headquarters, routed to Maintenance Division and from there to depot maintenance personnel either at the same or another base. The answer then returns through the same channels, in reverse.

A system such as this requires records and personnel at both the depot and at Headquarters, each substantially serving the same purpose. By placing prime responsibility at the depot, duplicate personnel and records at Headquarters would be unnecessary.

The long-range bombers which AMC ships to the combat wings have their counterpart in potential enemy countries. Oceans and half a continent mean nothing now. If an enemy should decide on a certain target, there is a good chance that at least one plane could slip through the defense and wipe out the target.

Wright-Patterson undoubtedly, as the nerve center of AMC, could be a prime target. An atom bomb, a series of conventional bombs or other missiles could put AMC Headquarters out of business and leave all the depots throughout the country with plenty of supplies and no established channel to direct their use.

With decentralization, however, an attack, on Wright-Patterson would reduce the effect on the Air Force's supply and maintenance system. Since orders would be received at the depot, supplies would

(Continued on page 126)

YESTERDAY'S PIONEER . . . TODAY'S LEADER

WELDON SUB-BASE
for GRINDING CLEARANCE ANGLES
FOR USE WITH THE WELL KNOWN
WELDON *END MILL SHARPENING FIXTURE*

Removes guesswork from the all important grinding of clearance angles. • Does away with the "cut and try" method. Increases tool life. • It is quick—it is positive—it is simple. • Write for complete details.

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you.

THE WELDON TOOL CO.
3000 WOODHILL ROAD · CLEVELAND 4, OHIO

PUBLICATION

Keep Informed! CATALOGS • BULLETINS • SPECIFICATIONS

A "Practical Comparison Chart" covering five manufacturers of jig and fixture components, and which includes comparative catalog numbers of 11 types and 71 sizes, is offered to tool designers by the Northwestern Tool & Engineering Co., 116 Hollier Ave., Dayton 3, Ohio.

Circle Inform-A-Gram No. B1.

"Phos-Silver", a new brazing alloy from Westinghouse, makes possible the efficient brazing of copper, brass, and bronze. Low brazing temperature, extreme fluidity, and good wetting properties are the main features. Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa., offers further information.

Circle Inform-A-Gram No. B2.

ARE YOUR *Best Bet!*

Finish grind dies, castings and similar work at correct high speeds and with ample power. Higher speeds permit the use of small diameter abrasive wheels. Save time and cut your costs. Onsrud Grinders operate in any position. Air keeps bearings and grinder cool. There are no commutator segments or brushes to wear. Choice of three precision built models. Light in weight . . . balanced spindles give vibration-free performance. Write for Grinder Bulletin 1129.

ONSRUD MACHINE WORKS, INC.
3941 PALMER STREET • CHICAGO 47, ILLINOIS

A Complete Line of Hardened Precision Parallels, magnetic parallels, and magnetic V-blocks is now available. They are made in 132 different sizes and lengths in single pairs or in selected sets, and are precision ground to guaranteed accuracy. Magnetic parallels and V-blocks are laminated by a specially developed process to assure maximum efficiency, holding power and shape retention. No pins or rivets are used to hold them together. Regular parallels are hardened to Rockwell 65C to withstand wear and retain accuracy in extended use. Anton Machine Works, 1226 Flushing Ave., Brooklyn, New York.

Circle Inform-A-Gram No. B3.

A New Mohawk Catalog Sheet for threaded stampings has been released. Descriptions of parts made by the company are given, representing a selection of the work that they are equipped to undertake. Small threaded stampings are produced in the Mohawk plant in one operation, and the process therefore reduces handling time and costs. The Mohawk Mfg. Co., 56 Hamlin Street, Middletown, Conn.

Circle Inform-A-Gram No. B4.

"Hi-Cyclic" Air and Hydraulic Operating Valves are described in bulletin 10-A from the Beckett-Harcum Company, Wilmington, Ohio. The complete line is covered, including reciprocating, spring loaded, and hand operated valves, and solenoid, air time delay and piloted valves. Unique "Hi-Cyclic" features make possible the complete control of air cylinder action. The stroke of a cylinder may be kept within .001".

Circle Inform-A-Gram No. B5.

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

The Matthews No. 204 General Purpose Marking Machine is the subject of a new bulletin. The 204 is made in four models, either manually operated, or semi or fully pneumatic. It may be applied to round, flat, or contoured parts, and since a rolling instead of a punching principle is utilized, lends itself to extremely fast, safe, and economical marking, and gives maximum die life. Jas. H. Matthews & Co., 3942 Forbes Street, Pittsburgh 13, Pa.
Circle Inform-A-Gram No. B6.

Interesting Operations In Cam Milling and Jig Boring are featured in a new catalog from the Eisler Engineering Co., Inc., 750 So. 13th Street, Newark 3, New Jersey. Also included are details of their contract work facilities, and descriptions of special machinery made to order by the company. Write for catalog No. 52-CN.
Circle Inform-A-Gram No. B7.

Various Size Ranges of Air-Blast Cabinets to serve a variety of applications are detailed in a release from the American Wheelabrator & Equipment Corp., 1183 S. Byrkit Street, Mishawaka, Indiana. The cabinets are available in both suction and pressure-type models, and are designed for small lots of work that can be manipulated by hand. Request Catalog 31-A.
Circle Inform-A-Gram No.B8.

Several Production Tools are described in a bulletin from the Anderson Bros. Mfg. Co., Rockford, Illinois. Included are hydraulic hand and power presses, balancing ways, and power and hand scrapers. These machines are built for the production line, and properly applied can cut costs and greatly increase output.
Circle Inform-A-Gram No. B9.

Walker Hydraulic Duplicators permit close-tolerance, high-speed machining, using standard equipment and unskilled manpower. Many applications are illustrated in a two-color booklet. Write for your copy to Walker Hydraulic Duplicator Co., Standish, Michigan.
Circle Inform-A-Gram No. B10.

A New Tap And Gage Catalog has been published by Rayco Tool Inc., North Branch, Michigan. It contains complete lines of taps and plug and thread gages, and also information on the Rayco gage repair service, set out in easy-to-read sections.
Circle Inform-A-Gram No. B11.

PRECISION KEYWAYS with an ADJUSTABLE GLENNY PUSH BROACH

Production or short-run keyway cutting can be accomplished in all types of bushings, sleeves, gears, etc., with the GLENNY adjustable push broach. Featuring 0.0005-inch accuracy, it can be instantly adjusted and micrometer checked for precision operations.

SPECIFY GLENNY . . . greater strength . . . maximum accuracy . . . fully adjustable for depth . . . interchangeable high-speed blades . . . bushing adapters available . . . will cut tapered keyways . . . hardened tool-steel external parts . . .

GLENNY broach sets are available for cutting keyways in bores ranging in diameter from ¼ to 2½ inches.

181 KM

KASE MACHINE COMPANY
18572 Buffalo Avenue
Cleveland 19, Ohio

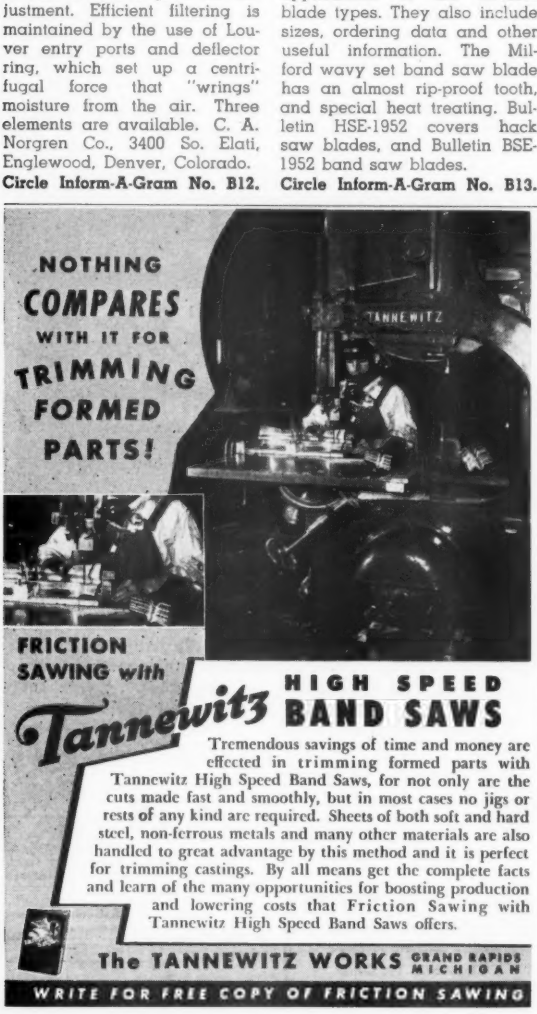
KASE MACHINE COMPANY
Please send (without obligation) your new Bulletin No. 13 containing sizes, specifications and prices of GLENNY broaches and kits.

NAME _____
COMPANY _____ TITLE _____
STREET _____
CITY _____ ZONE _____ STATE _____

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

New ¾" and 1" Air Line Filters with replaceable, transparent bowls are detailed in Norgren literature. For use on air-flows of from 0 to 140 cfm at pressures of 0 to 150 psi and temperatures between 40° and 150°F., the filters are fully automatic and require no adjustment. Efficient filtering is maintained by the use of Louver entry ports and deflector ring, which set up a centrifugal force that "wrings" moisture from the air. Three elements are available. C. A. Norgren Co., 3400 So. Elati, Englewood, Denver, Colorado.
Circle Inform-A-Gram No. B12.

Milford Hack And Band Saw Blades are described and illustrated in two new six-page folders from the manufacturer, Henry G. Thompson & Son Co., New Haven 5, Connecticut. The folders are printed in two colors, and describe the proper applications of the several blade types. They also include sizes, ordering data and other useful information. The Milford wavy set band saw blade has an almost rip-proof tooth, and special heat treating. Bulletin HSE-1952 covers hack saw blades, and Bulletin BSE-1952 band saw blades.
Circle Inform-A-Gram No. B13.


NOTHING
COMPARES
WITH IT FOR
TRIMMING
FORMED
PARTS!
TANNEWITZ
FRICTION
SAWING with
Tannewitz
HIGH SPEED
BAND SAWS
Tremendous savings of time and money are effected in trimming formed parts with Tannewitz High Speed Band Saws, for not only are the cuts made fast and smoothly, but in most cases no jigs or rests of any kind are required. Sheets of both soft and hard steel, non-ferrous metals and many other materials are also handled to great advantage by this method and it is perfect for trimming castings. By all means get the complete facts and learn of the many opportunities for boosting production and lowering costs that Friction Sawing with Tannewitz High Speed Band Saws offers.
The TANNEWITZ WORKS GRAND RAPIDS MICHIGAN
WRITE FOR FREE COPY OF FRICTION SAWING

Automatic Stamping for Mass Production is the subject of a new catalog from Verson. It features descriptions of eight typical applications of Verson Transmat presses, which have multiple die stations and separately adjustable slides. Work is transferred from station to station by mechanical fingers synchronized with the press action. No carrying strip is therefore needed, waste is eliminated, and a much wider range of operations made possible. Production figures instanced include 1800 aluminum refrigerator trays per hour, 1300 automotive coil containers per hour, and 720 trim rings per hour. These presses can be equipped to feed coil stock or developed blanks, and have automatic fittings for scrap removal and discharge, for applying drawing compound to the blanks, and for gaging blank thickness and immediately stopping the press if a double blank should be fed. Verson Allsteel Press Co., 9300 South Kenwood Ave. Chicago 19.

Circle Inform-A-Gram No. B14.

Carbide Rivet Sets and Rivet Heading Dies having fifty to three hundred times the life of steel sets are made by the Radius Tool Co., 672 Villa Street, Elgin, Illinois. Due to the hardness and mirror finish of the carbide, galling is prevented during the process of rivet setting, the metal flowing evenly with less pressure required. These carbide rivet sets may be used on spinning, vibrating, or impact-type machines, and are made in sizes from ⅛" to ¾" in diameter, to customer specifications.
Circle Inform-A-Gram No. B15.

A Complete Vise Catalog has been issued by the Wilton Tool Mfg. Co., 925 Wrightwood Ave., Chicago 14, Ill. The catalog, No. 108, is graphically illustrated, and in addition to the broad lines of vises, carries eight pages on the Wilton "Powrarm Positioner."
Circle Inform-A-Gram No. B16.

"Elasticone" Guide Pin Covers, designed to eliminate the pinch point between pin and bushing on punch press die sets, are helically wound flat steel springs, produced in a special alloy and temper. The covers are inserted over the pin and bushing of the set (between the upper and lower shoes) and are held in place by their own spring tension. Offering automatic protection for operators, the covers also protect pins and bushings from nicks, scratches, and dust. They are stocked in a variety of sizes to accommodate most die sets. A technical data sheet is available from the Central Safety Equipment Co., Philadelphia 25, Pa.
Circle Inform-A-Gram No. B17.

A New Plain Grinding Machine designed to accommodate large diameter work pieces such as jet turbine rotors and large diameter motor armatures is described in literature from the Landis Tool Company, Waynesboro, Pa. Called the 30"-36"-48" Type CWH Plain Grinding Machine, it features extra-wide spacing of the carriage ways to provide maximum stability when machining large diameter work. Equipment and condensed specifications are included in the catalog sheet, as well as several detail photographs of machine features.
Circle Inform-A-Gram No. B18.

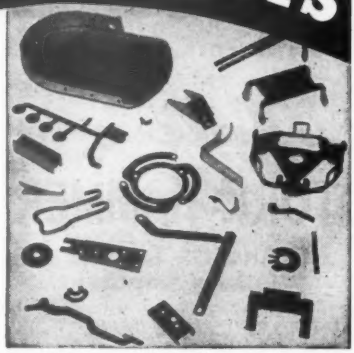
Carburizing And Tempering Baths are featured in a new bulletin from the A. F. Holden Company, 460 Grand Avenue, New Haven 11, Connecticut. The bulletin contains helpful charts showing the relative case penetrations at various times and heats; the savings made with carbon blanket cover, the amount of salt to be added each 8-hour period to balance bath and maintain operating efficiency, and instructions for controlling distortion to less than .001 inch. Four different models of Holden carburizing baths are pictured
Circle Inform-A-Gram No. B19.

Shaving And Forming to production tolerances of ± .00025" are possible with the "Jemco Little Shaver", This new tool will fit the standard circular form tool holder or the back slide on a Brown & Sharpe automatic screw machine, and with slight modification can be used on other automatic and hand screw machines and turret lathes. Standard rise cross slide cams can be used, and long runs may be machined without sharpening or adjusting the tool. Two models made in three sizes are available. Jersey Mfg. Co., Elizabeth 1, N. J.
Circle Inform-A-Gram No. B20.

"Small Cutting Tool Of Extreme Precision", a new 18-page illustrated catalog, is available from Woodruff & Stokes Co., Inc., Bldg. 38, 349 Lincoln St., Hingham, Mass. The catalog includes the complete W-S line featuring carbon-steel taps, prong dies, small reamers, hollow mills and centering tools, small counterborers and step drills. Typical case histories of applications of these tools are described, together with small tool specification sheets to be completed and sent on to expedite correct deliveries.
Circle Inform-A-Gram No. B21.

DIE CUT PARTS

WLS SPEEDTOOLING Gives You PRECISION STAMPINGS for a Tool Charge as Low as 1/10 the Cost of Ordinary Dies



Our Specialty: Small Irregular Shaped Parts Stamped, Formed, Pierced, Extruded, Stencilled, Tapped, Countersunk.

For detailed information, send for literature. For firm quotations and delivery commitments, send us your prints.

WLS STAMPING COMPANY
Short Run Stampings

3290 East 80th Street Cleveland 4, Ohio

Write Us Today!

SHORT RUN STAMPINGS

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

The Wales Sheet Metal Fabricator is described in a new catalog No. 10A. The Wales "Hydra-New-Matic" head is featured, together with the 3½" holder that punches round and shaped holes up to 3½" in diameter, and punching, notching, and nibbling equipment. The Hydra-New-Matic head operates with a minimum of noise at 165 strokes per minute for single hole punching and nibbling, and is noteworthy for its simplicity of design and operation. Write for complete information to the Wales-Strippit Corporation, 345 Payne Ave., North Tonawanda, N. Y.

Circle Inform-A-Gram No. B22.

A New Synthetic Cutting Fluid that forms a clear solution with all proportions of water at room temperature has just been announced by Carbide and Carbon Chemicals Co., 30 E. 42nd. St., New York 17, N. Y. Faster cutting, longer tool life, and better finishes are obtained in all machining operations on stainless steel, carbon steel, chrome-molybdenum and other alloy steels, aluminum, and phosphor-bronze. Fluid left on parts provides rust protection, and the inhibitors are effective in water solutions. Write for Form 7899 on Ucon Cutting Fluid H-660.

Circle Inform-A-Gram No. B23.

Speed Production...

With This Husky

Mall TORK-HAMMER

Model 2EW

And Its Terrific Rotary Impact!

Put more power into manpower with this speedy portable Impact Tool that handles any tightening or removing operation. Runs nuts and bolts up to ½-inch in size. Quick conversion for drilling, reaming, tapping, extracting broken capscrews or studs . . . Drives wood augers, wire brushes, sanders, etc. Ideal for close quarter work.

Mall Portable Electric Screwdriver

Speeds shop operations. Equipped with 2 finder-type bits, Allen hex wrench.

Send for Descriptive Bulletin No. 2422

Model 143S

40 Factory-Owned Warehouses, Coast To Coast To Serve Our Customers And Thousands of Dealers.

Mall MALL TOOL COMPANY

7712 S. Chicago Ave. • Chicago 19, Illinois

An Automatic Force-Feed Spray Lubricator for punch and shear operations is manufactured by the Manzel Division of Frontier Industries Inc., 315 Babcock Street, Buffalo 10, N. Y. Synchronized directly with the machines, jets of oil mist are forced onto the punches, shearing edges, dies or other parts. Compressed air and oil are fed together into a sprayer nozzle aimed at the critical area, the air acting as both suspending agent and coolant. A descriptive illustrated booklet is available from the manufacturer.

Circle Inform-A-Gram No. B24.

A Line Of Centerless Polishing And Abrasive Belt Surfacing Machines is featured in a booklet called the "Production Story" from the Production Machine Co., Greenfield, Mass. The booklet contains details covering four special machines. Of particular interest is the model 914, which utilizes contact wheels and abrazive belts for speed and accuracy. The booklet also contains details of the company laboratory facilities which are at the service of customers.

Circle Inform-A-Gram No. B25.

"Nava-Mar" Vise Face Plates have recently become available and are featured in a two-color folder from the manufacturer. These face plates are positioned on the vise-jaws, can't fall off, and are made in all sizes and types of facing. Write the Maroth Engineering Co., Wilton, Connecticut.

Circle Inform-A-Gram No. B26.

The Brickner-Kropf Filing And Lapping Machine together with other tool and die working equipment is the subject of a catalog from the maker. Constructional details and complete specifications are given. Write the Brickner-Kropf Machine Co., Inc., Muskegon Heights, Michigan U.S.A., for details.

Circle Inform-A-Gram No. B27.

New Methods in Industrial Hard Chrome Plating are discussed in a bulletin offered to T&P readers. The Ward Leonard Electric Co. has recently evolved a new plating solution called "Chromasol", and the bulletin features the use of this solution in conjunction with Ward Leonard plating tanks, standard models of which are built in 20, 50, and 250 amp. capacities. Complete tank design features are given, and an interesting section is given to hints on the method of application of the new process, which is faster, more economical, and produces better results than previous methods. Write Ward Leonard Electric Co., 31 South Street, Mount Vernon, N. Y.
Circle Inform-A-Gram No. B28.

A New Jig Borer combining power, speed, and precision, and with built-in standard scales viewed on projection screens is described in a catalog from Cosa Corporation, Chrysler Bldg., Lexington Ave., New York 17, N. Y. Called the "Hydroptic 6", the machine has a guaranteed accuracy of .00015 in., a working range of 40"x28", and a free space under the spindle of 35½". The machine has many other interesting features in addition to the viewing screens, which permit settings to be made by visual coordination of standard scales built into the table and spindle head. The catalog contains drawings and complete specifications, and a list of additional optional equipment.
Circle Inform-A-Gram No. B29.

Precision Engineered Live Centers, with matched Timken bearings, a guaranteed maximum runout of .0002", and heavy duty grease seals and bearing retainer rings are made with male and female inserts, and also in a pipe series, with a capacity up to 3⅛" inside diameter. Holub Industries Inc., Sycamore, Illinois.
Circle Inform-A-Gram No. B30.

Tool Pre-Setting Gages manufactured by Scully-Jones & Co., are described and illustrated in a new four page bulletin No. 19-50. Standard stock sizes of Flush Pin Gages and height gages for setting tools used in multiple spindle machines are included. A special combination tool board and bench which is designed and built especially for tool gaging setups is also featured. All flush pin gages and height gage assemblies are detailed on a standard price list for easy reference. Scully-Jones & Co., 1913 So. Rockwell St., Chicago 8, Ill.
Circle Inform-A-Gram No. B31.

Elf Dry Lubricators for band saws and drills are the subject of a folder from the Aviation Lubricants Co., Inc., 1921 India Street, San Diego 12, California. Elf lubricants are manufactured in solid form, and are designed for maximum efficiency with minimum mess. Band saw applications have increased cutting speeds 30%, and blade life 300%, give greater accuracy and improved finishes, and eliminate saw chatter, stopping work-hardening of the blade. Parallel results are obtained in the drill applications.
Circle Inform-A-Gram No. B32.

"M-40-U" ALLOY CENTERS

Give You PRODUCTION-PROVEN "DEEP CORE DESIGN"

Get more for your center dollar with Gorham "DEEP CORE DESIGN!" "M-40-U" Alloy Centers are PRODUCTION-PROVEN in the largest plants. They consistently outlast high-speed and other alloy centers, stand far more abuse. Although equal to carbide in wear resistance, they cost less, are easier to redress.

And Gorham's exclusive "DEEP CORE DESIGN" allows many more redressings, too! A core of "M-40-U" Alloy, developed by Gorham expressly for wear, abrasion and heat resistance, is induction brazed deep in the shank, after which the entire center is finish ground, giving you wear material permanently supported by tough shank steel!

Gorham "M-40-U" Alloy Centers are available with Morse, B. & S. or Jarno taper shanks. Immediate delivery on popular sizes, "specials" to specification. Free literature gives description, dimensions, prices. Send for your copy today.

"DEEP CORE DESIGN"

Gorham TOOL COMPANY

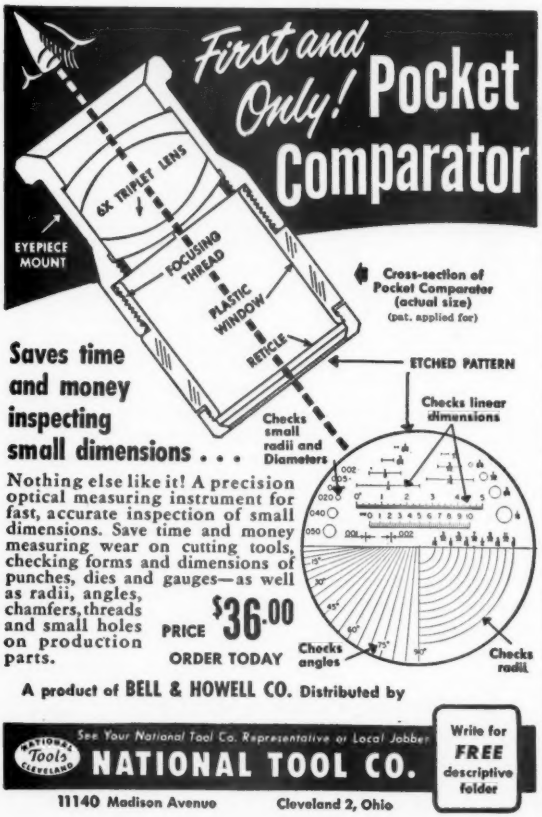
"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14415 WOODROW WILSON • DETROIT 3, MICHIGAN

WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

Diamond Heavy Duty Radial Drills of two models are the subject of a catalog sheet from the Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, California. Complete specifications for the two models are given, the capacity of the larger being up to 2-9/16" in cast iron. Both models are of similar construction details, which include a disc clutch in the top part of the saddle which permits smooth starting of the spindle, a considerable advantage in tapping operations. Speed changes are effected by a hand lever.
Circle Inform-A-Gram No. B33.

A Precision Tool-Room Vise is described in a new technical bulletin. This sturdy vise is designed for jig borers, surface grinders, drill presses, and tappers. It combines light weight with a wide jaw opening and a low frame. A quick-acting grooved spindle plus a locking latch permits rapid and positive adjustment. Step jaws eliminate the need for parallels, and there is a special feature for holding punches. All surfaces are hardened and ground. Write for bulletin TE2-103 to Producto Machine Co., 990 Housatonic Ave., Bridgeport 1, Connecticut.
Circle Inform-A-Gram No. B34.


First and Only! Pocket Comparator
6X TRIPLET LENS
EYEPIECE MOUNT
FOCUSING THREAD
PLASTIC WINDOW
RETICLE
Cross-section of Pocket Comparator (actual size)
(pat. applied for)
ETCHED PATTERN
Checks linear dimensions
Checks small radii and Diameters
Saves time and money inspecting small dimensions . . .
Nothing else like it! A precision optical measuring instrument for fast, accurate inspection of small dimensions. Save time and money measuring wear on cutting tools, checking forms and dimensions of punches, dies and gauges—as well as radii, angles, chamfers, threads and small holes on production parts.
PRICE $36.00
ORDER TODAY
Checks angles
Checks radii
A product of BELL & HOWELL CO. Distributed by
See Your National Tool Co. Representative or Local Jobber
NATIONAL TOOL CO.
11140 Madison Avenue
Cleveland 2, Ohio
Write for FREE descriptive folder

Ingersoll-Rand Company has just published a comprehensive thirty-six page catalog covering their complete line of "Multi-Cycle" electrical tools. The catalog is divided into eight sections; impactools, nut runners, drills, screw drivers, grinders, buffers, sanders, and polishers. Over a hundred different sizes are listed covering both 180 and 360 cycle models. Complete lists of equipment and accessories are also included. Ingersoll-Rand Company, 11 Broadway, New York 4, New York. Requests form 5111.
Circle Inform-A-Gram No. B35.

Buhr Special Machinery is dealt with in a fine new catalog that is meeting enthusiastic reception among those who specify and purchase drilling, tapping, reaming and chamfering production equipment. Twenty-eight representative types are displayed, each page shows a machine, a drawing of the part it processes, and tooling and the work done at each station. A short resume of the part and production and type of equipment and tooling is then given. A pictorial section is devoted to the company manufacturing facilities. The catalog is available at no charge to key personnel, and may be secured by writing the Buhr Machine Tool Co., Ann Arbor, Michigan.
Circle Inform-A-Gram No. B36.

Carbide Cutting Tools and Carbide Blanks are featured in a 48 page catalog from Wesson. This catalog is completely new and contains specifications of complete ranges of standard and special solid and tipped carbide tools. The principle of the exclusive band locking feature on Wesson Multicut tools is explained and many interesting applications in heavy duty machining are shown. Write Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Detroit 20, Michigan.
Circle Inform-A-Gram No. B37.

Short Cuts To Rotary Tool Economies are featured in three new bulletins from M. A. Ford. Vol. 3, No. 1, of "Ford Filings" contains reports of recent aluminum and magnesium applications of Ford high-speed tools. Suggestions for increased efficiency are given, together with a chart showing recommended speeds for rotary files and cutters. Bulletin GI 203 describes and illustrates the complete line of Ford tools in a concise manner, and Bulletin GI 201 contains a helpful ordering guide for purchasing executives. Write M. A. Ford Co., Inc., 817 West River Street, Davenport, Iowa.
Circle Inform-A-Gram No. B38.

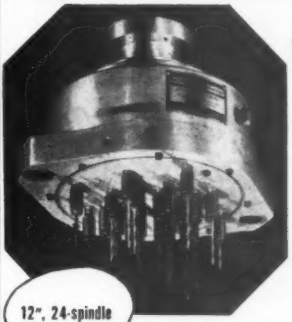
A Casting Service for Industry is described in a new brochure detailing the production facilities of the Production Pattern & Foundry Co. This is a well organized modern plant making castings to close tolerances on high production runs at the lowest possible cost. A new shell process where cast iron pieces are made with similar tolerances and finishes to those obtained in die casting is used extensively to cut production costs. The plant has its own wood and metal pattern shops, and offers a complete service from blue-print through pattern to casting. Annealing, normalizing, and stress relieving are also performed on the premises as required. Write for a descriptive brochure to the Production Pattern & Foundry Co., McKinstry Ave., Chicopee, Mass.
Circle Inform-A-Gram No. B39.

A Condensed General Catalog of Gorton Machinery is now available. Machines for milling, profiling, die sinking, and engraving are described. Specifications of all pictured models are given, and there is an interesting section on tracer controlled machines built for special requirements. The catalog is exceptionally well illustrated and set out. Write George Gorton Machine Co., Racine, Wisconsin.
Circle Inform-A-Gram No. B40.

A New Abrasive Cutoff Bulletin describes the full line of Tabor machines for abrasive wheel cutting in foundry, general metal-working, and special applications. Twenty-one photographs cover units ranging from 3 to 20 horsepower. Information includes complete specifications, cutting capacities, working area needs etc., for units designed to cut wet or dry, bevel or right angle. The bulletin contains 16 profusely illustrated pages. Write the Tabor Mfg. Co., 6225 Tacony Street, Philadelphia 35, Pennsylvania.
Circle Inform-A-Gram No. B41.

The Alemite Oil-Mist Lubrication System is described in an attractive booklet, which gives details of components and several suggested applications. The system has manifold proven advantages. In use on grinder bearings, it has made possible better than fourteen times the life obtained with conventional lubrication. It is completely automatic, cuts oil consumption by as much as 90%, and eliminates guesswork and over-oiling. Alemite Division of Stewart-Warner Corp., 1826 Diversey Parkway, Chicago.
Circle Inform-A-Gram No. B42.

RAISE YOUR HOLE QUOTIENT



WITH A STANDARD Zagar GEARLESS DRILLHEAD...

12", 24-spindle drillhead; capacity to 1" in steel.

drills any number of holes in any pattern

Write for Manual T-7

Drill a maximum number of holes in one pass—in any material. Holes can be as close as twice drill diameter. Zagar gearless drillheads are built as a complete unit or may be adapted to any standard drill press. Send us your part drawing and we will submit our quotation.

ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, O.

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

"High-Speed Automatic Gaging and Sorting" with Federal equipment is the subject of a new 20 page bulletin. Automatic gages and gaging methods by Federal, including continuous measuring gages are discussed and illustrated. All employ electro-mechanical and electronic systems for obtaining the desired results. They differ from the straight electrical sorting gages in that the electronic system enables parts to be sorted into numerous categories according to requirements. Complete descriptions of all equipment are given. Write the Federal Products Corp., 1144 Eddy Street, Providence 1, Rhode Island.

Circle Inform-A-Gram No. B43.

The Sundstrand Machine Tool Co., has produced a bulletin on industrial sanding. It covers three major subjects,—first the advantages of straight-line sanding action, then illustrations showing sander applications in plants, and lastly specifications of the four models of Sundstrand air sanders and accessories. Pictured applications include deburring and sanding of sheet metal, polishing dies, and the blending and graining of stainless steel. Each model is available for wet or dry sanding on flat or curved surfaces, with complete accessories. Bulletin No. 2109, Sundstrand Machine Tool Co., Rockford, Ill.

Circle Inform-A-Gram No. B44.

ANOTHER GRINDING ROOM PROBLEM SOLVED!

The small, precision-built machine you see above is the Radi-Form, a grinder attachment, that does almost everything but talk. The Radi-Form can move the work in a predetermined arc of any desired radius, from 1/16" to 2" concave, from .00 to 2" convex, which means that radii can now be generated even on carbide tipped cutting tools in a matter of minutes, to within .0005 accuracy on a standard, unformed, cupped diamond wheel. You save headaches, time, and gain increased production. Write for literature and prices that will surprise you.

W. F. MEYERS CO., INC., BEDFORD, INDIANA

Flexible Round Files which will file any material of any profile by bending the tool to the desired shape are described in a circular from Tec Imports, 14404 Addison St., Van Nuys, California. The files have special, non-clogging tooth profiles, and are made in increments of 1/32", from 3/32" to ¼" diameter.

Circle Inform-A-Gram No. B45.

Squirrel-Cage Induction Motors of drip and splash proof types in ratings of ½ to 100 horsepower are described in a new bulletin. Construction features, ratings and dimensions are detailed. The motors are available with many special modifications such as totally enclosed, vertical mounting, flange mounting, and multi-speed construction. All ratings are made in NEMA Design B, and most in NEMA Design C. Design B motors are suitable for the majority of cage motor applications. Bulletin 51B6210D, "Squirrel-Cage Induction Motors," from Allis-Chalmers Co., 1013 S. 70th Street, Milwaukee, Wisconsin.

Circle Inform-A-Gram No. B46.

"Electro Arc" Metal Disintegrators combine a special gravity feed and head operation to eliminate lost time due to interrupted circuit, and assure a constant disentegrating contact with the work 60 times each second. Complete details are contained in a sheet from the Electro Arc Mfg. Co., P. O. Box 448, Ann Arbor, Michigan.

Circle Inform-A-Gram No. B47.

Hardinge Style "S" Master Collets engineered to eliminate work pressure on the screw, and style "B" master feed fingers made without pins or screws, are described in a folder from Hardinge Bros., Inc., Elmira, New York. Design is enterprising and thoughtful, and backed by long experience in the field.

Circle Inform-A-Gram No. B48.

The Galileo Contour Projector has recently been introduced into this country by the Opplem Co., Inc., 352 Fourth Ave., N.Y.C., New York. It incorporates all the features of tool microscopes and comparators, and offers the advantage of direct vision on a screen instead of the usual observation through an eye-piece. A folder from Opplem gives drawings and specifications of the machine, including accessories. Measurements can either be made directly or from a template or drawing.

Circle Inform-A-Gram No. B49.

The "Recipro Tool" is a new marker recently made available. Specifications include 5¼ lbs. impact at the tool head, 7200 power strokes per minute, built-in lubrication, and a stroke that can be adjusted from 0 to ⅛". The tool fits neatly to the hand, and has a low center of gravity. It is available with a variety of alloy steel bits, (for materials up to Rockwell 50C), or with diamond bits. S.C. & L. Machine Co., 1121 Fourth Ave., Rockford, Illinois.

Circle Inform-A-Gram No. B50.

Precision Rotary Jig And Pilot Bushings are listed and priced in a catalog from Gatco Rotary Bushing Co., 1300 Mt. Elliott, Detroit 7, Michigan. Diagrams of turret lathe and drill press applications are included, together with hints to the tool designer, and specifications. The bushings are dust and water proof.

Circle Inform-A-Gram No. B51.

A Heat-Resistant Abrasive Belt is illustrated in a folder issued by the Behr-Manning Corp., Troy, New York. Called Resinall Metalite, this resin bond belt is available in a series of grades, and is said to last from two to four times as long as a normal glue-bond belt. The folder also includes details of Behr-Manning's research and method's service.

Circle Inform-A-Gram No. B52.

"Klamp-Lok" Toolholders With Mechanically Clamped Solid Carbide Inserts are the subject of circular No. KL-52. Quick adjustment from either top or bottom gives flexibility in clamping, adjusting, or removing the carbide insert. The open facing of the insert prevents chip erosion of the toolholder, and a trigger action spring assures fast and easy insert removal. The inserts can be reground without removing the toolholder from the machine setup. The circular gives full price, size, and grade details of inserts and holders, and is available from the Metal Carbides Corporation, Youngstown 7, Ohio.

Circle Inform-A-Gram No. B53.

Presentation of your inspection problems is invited by Stocker and Yale. Their brochure on contour and front surface projectors details a range of ten models of optical measuring instruments covering every phase of shop inspection work. Model 100U combines contour and front surface projection systems with a precision micrometer measuring stage and crossline screen. All models have screen and stage positions for maximum operator comfort and efficiency, and minimum time and motion per operation. Accessories are available for all models. Write Stocker & Yale Inc., Marblehead, Mass.

Circle Inform-A-Gram No. B54.

SHELDON
CHICAGO

A better Lathe from any angle

Judge it from any angle: for accuracy, stamina, rigidity or capacity (for size). Check its component parts—its spindle, spindle bearings, lead screw, apron, carriage, bed, gearing, or the power delivered by its drive—you will find the SHELDON Lathe a quality tool both in appearance and "under the hood".

Write for Catalog

SHELDON MACHINE CO., Inc., 4235 North Knox Ave., Chicago 41, Ill.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

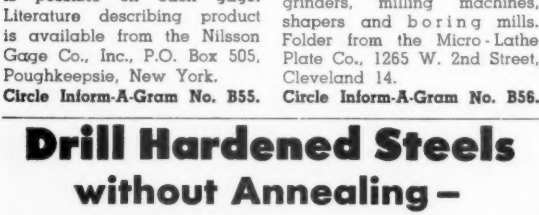
A Nilco Dial Groove Gage for checking groove locations has recently been announced. Designed to check locations of internal grooves for truarc or other retaining rings, the gage is simple, portable, light, and easy to handle. Actuation of a trigger controls the gaging unit, collapsing it as it enters the bore, and a spring return holds the part while the gaging pin is set in place when the trigger is released. Adjustment of diameter as well as range is possible on each gage. Literature describing product is available from the Nilsson Gage Co., Inc., P.O. Box 505, Poughkeepsie, New York.

Circle Inform-A-Gram No. B55.

The Micro-Lathe plate is described in a new folder issued by the manufacturer. Designed to take the place of special jigs and fixtures, this new universal tool offers many advantages to job machine shops, tool rooms and experimental departments. It simplifies tooling problems on casting and forgings, and can save hours on tooling jobs. The Micro-Lathe plate and work holding attachments may be used on engine and turret lathes, drill presses, grinders, milling machines, shapers and boring mills. Folder from the Micro-Lathe Plate Co., 1265 W. 2nd Street, Cleveland 14.

Circle Inform-A-Gram No. B56.

Drill Hardened Steels without Annealing –



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It— With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1368 East 222nd St. • Cleveland 17, Ohio

Also makers of— **BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS**
Write for information

"Web-O-Matic", A Self-Cleaning Web-Type Filter for individual machine tools or for small central coolant systems can cut coolant filtration costs up to 75%. Web-O-Matic eliminates the necessity for frequent filter changing, extends coolant life, and helps improve product finishes and increase production. Honan-Crane Corp., 208 Indpls. Ave., Lebanon, Ind.

Circle Inform-A-Gram No. B57.

A New Non-Critical Cast Iron Welding Alloy is described in case history form in leaflet TIS 991 from Eutectic Welding Alloys Corp., Dept. P, 172nd St. and Northern Blvd., Flushing 58, New York. Instanced are applications resulting in savings of up to 80% in replacement costs and a full 100% increase in production, plus technical data on applications and physical properties.

Circle Inform-A-Gram No. B58.

Typical Planetary Milling Operations are described in a new folder issued by the Plan-O-Mill Corp., 1511 E. Eight Mile Rd., Hazel Park, Michigan. Proper applications of the Plan-O-Mill can effect all-round production economies. Most forms and threads are machined with a single feed revolution of the cutter around the work, and either fully or semi-automatic setups are possible.

Circle Inform-A-Gram No. B59.

Champion "Hi-Rockwell" Drills give first rate cutting performance in steels whose Rockwell hardness ranges from C-40 to C-68. They are special high density tungsten-carbide tipped tools, and will cut oil, air, and water hardened tool steel without annealing the stock, giving fine, solid chips. Where stock hardness variation is common, as in certain cast irons, cast steels and forgings, "Hi-Rockwell" drills are also very useful. Write for descriptive folder to Champion Tool Co., 24060 Orchard Lake Rd., Farmington, Mich.

Circle Inform-A-Gram No. B60.

A Dye Penetrant Inspection Method is described in the latest literature from the Met-L-Check Co., 121 N. Prairie Ave., Hawthorne, Calif. The method is simple, and can be applied to any metal and most plastic products. Full instructions are given, together with a description of the setting-up of foolproof inspection on a production line basis.
Circle Inform-A-Gram No. B61.

3H Safety Lock Sheet Metal Clamps with particular applications in the aircraft industry are featured in a new catalog from the Monogram Mfg. Co., 2204 Colorado Street, Santa Monica, California. The range covers all sheet clamping needs, and when used with proper applying tools combines a number of advantages, not the least of which are operational speed and positive protection for the worker.
Circle Inform-A-Gram No. B62.

New Conception of Strip Handling at the shear is described in a catalog from Fried Steel Equipment Mfg. Corp., 528 E. 119th St., New York 25, N. Y. The most difficult and time-cunsuming handling and feeding operations behind and in front of the shear are made semi or fully automatic. Fried strip conveyors, stackers, and positioners offer a complete solution to the disruption of production resulting from operator fatigue and high accident rates. Shearing accuracy radically improved.
Circle Inform-A-Gram No. B63.

Boring, Facing, and Internal Threading Tools are listed and priced in a catalog from the R. B. Tool Co., Inc., 41 E. Hartsdale Ave., Hartsdale, N.Y. Full pages are given to the new R. B. type ST spring and swivel holder for threading tools, which gives a constant threading angle, interchangeability, easy adjustment of lead angle, and eliminates hooking and rehardening, and to grinding instructions for the range.
Circle Inform-A-Gram No. B64.

An Improved Vertical Milling Machine is the subject of a new catalog from the Index Machine Co., 543 North Mechanic Street, Jackson, Michigan. Improvements incorporated include an increased feed range for today's requirements which makes possible the use of carbide cutters and the efficient machining of nonferrous metals. The positive automatic stop and depth gage insures absolute safety at all times, whether using power or hand fed. Lever feed and spring balanced quill permit easy adaptation to duplicator and permanent mold work. Catalogs for the model 55 and accessories are available.
Circle Inform-A-Gram No. B65.

The Davis Eight Position Tool Holder for vertical boring and turning mills will enable the operator to turn, undercut, bore and chamfer in one set-up. Four tools can be mounted at once, with positive position assured by two index pins. One simple wrench adjustment changes tool position through 360 degrees in accurately indexed increments of 45 degrees. A center pin locks the complete assembly in rigid alignment and clamps it solidly. Set-up time is lessened, and production consequently increased. Davis Boring Tool division of Giddings and Lewis Machine Tool Co., Fond Du Lac, Wisconsin.
Circle Inform-A-Gram No. B66.

SAVE TIME AND MATERIALS

Oil-hardened tool steel tapered pin gages accurate to + 0.0001" − 0.0000" insure dependable sizing and location of holes and slots for machinists, set-up men, tool and die men, inspectors, all who need precise hole measurement.

CONCENTRIC TAPER on lower half of each gage fits holes 0.0012" smaller than standard letter, fraction, and number size drill holes. Makes insertion easier. Permits gaging of odd-size holes and slots.

ALL GAGES are 1½ inches long. Sets contain a pair of each size in a plastic case with 4-place decimal equivalents of each size plainly marked.

ALL ITEMS STOCKED FOR IMMEDIATE DELIVERY

THE Horberg GAGE COMPANY

29 STAPLES ST., BRIDGEPORT, CONN.

Quantity
..... Letter sets @ $45. 52 gages (A-Z)
..... Fraction Sets @ $50. 60 gages (1/64" to 1/2" in 1/64" steps)
..... Number Sets @ $90. 120 gages (1 to 60)
..... Single gages @ $ 1.
..... Stand alone @ $10.

Please Rush checked items and literature to
company.....
address.....
name.....
title.....

. . . Free Cutting Copper, from page 58

3 is an example of a deep hole which is drilled in two operations; the first turret feeds the material to stop, the second turret spots while the third turret position drills the hole to approximately ⅝ inches in depth. The fourth turret position finishes drilling to the required depth. During drilling, the circular form tool mounted on the front slide overlaps and forms during drilling. The fifth turret position is reserved for counterboring while the back slide containing a circular cut-off parts the machined item from the bar. The tool thickness of the circular blade is approximately 0.060 inches and is operated with a feed of about 0.0035 inches.

The example as illustrated in Figure 4 is a combination of operations involving knurling, threading, forming and turning. The first turret position feeds the stock to stop; the second turret position utilizes the box tool for turning; the knurling swing tool is employed in the third turret position; and, threading is performed in the next turret position. During turret position work, the back slide containing the circular form tool performs and at the front slide position, the circular cut-off is employed to part the piece. The tool thickness of the circular cut-off is approximately 0.100 inches while the feed is approximately the same as that stated above.

In an example such as is illustrated in Fig. 5, a secondary operation of roll threading is performed on the machine piece. Thus, in this problem, the first turret position feeds the stock to stop, the second turret position containing a box tool turns the diameters; the threading is done on the third turret position; and, knurling is done on the fourth turret position in the same manner as stated previously. A shallow and narrow forming operation is performed with a circular form tool operated from the front slide. Another feed operation is reserved for the fifth turret position and the cut-off, operating on the back slide parts the item from the bar. An auxiliary operation of roll threading is required to complete the part.

In order to employ to advantage this 'overlapping' feature on automatics, careful planning, not only in setting up operational procedures, but also in determining the best tool type, is required. In many instances, as stated previously, it may be good economics to have auxiliary operations; in some instances, due to the shape of the part, auxiliary operations are mandatory. Also such factors as surface finish and accuracy should be taken in consideration which, in some instances, will dictate the choice of tooling that may be required.

Table III

Recommended Feeds for Box Tools [5]

	Depth of Cut, Inches	Feed, Inches
Roller rest, 1 chip finishing	1/32	0.012
	1/16	0.010
	1/8	0.008
	3/16	0.008
	1/4	0.006
Finishing	0.005	0.010

Recommended Feeds for Hollow Mills and Balance Turning Tools [5]

	Width of Cut, Inches	Feed, Inches
For turned diameters, under 5/32 inches	1/32	0.012 -0.030
	1/16	0.010 -0.025
	1/8	0.010 -0.025
Pointing and Facing Tools		0.001 -0.0025
Recessing Tools, end cut		0.001 -0.005
Inside Cut, 1/16-1/8 inches		0.0025-0.008

Either the carbon tool steel or the high speed steels are all that is necessary to machine the free-cutting copper base alloys; the latter type of tool steel often being the preferred where medium to long runs are anticipated. In many instances, it has been found that thinner cut-off tools can be employed than that experienced in the cutting of other materials; the saving in stock realized being in proportion to the size and quantities of the parts machined. The use of carbide tooling is usually reserved for the machining of the more difficult non-leaded copper alloys, or may be employed on occasion where a large amount of material must be removed. In either case, the use of carbides have often proven satisfactory even though they are comparatively brittle in comparison to the tool steel compositions.

A light mineral oil having a Saybolt viscosity of 100 seconds at 100 degrees Fahr. can be employed for screw machine work on the leaded brasses of low copper content. The use of a richer lubricant con-

(Continued on page 128)

EFFICIENT ECONOMICAL
ROUGH GRINDING AND FINISH GRINDING
NEAREST THING WE KNOW TO A DIAMOND WHEEL
FOR PRECISION AND OFFHAND GRINDING

New XL BOND

FOR CARBIDE TOOL AND CUTTER GRINDING

"XL" is Chicago Wheel's exclusive new bond for silicon carbide vitrified grinding wheels, especially made for grinding carbide cutting tools. Supplied in most popular sizes and steel backs. Prompt delivery. Keep your production up . . . costs down, with "XL."

Write today for information—Dept. TP

CHICAGO WHEEL & *Mfg. Co.*

1101 West Monroe St., Chicago 7, Illinois

OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

JUST OFF THE PRESS!

Handbook and catalog—shows how to select magnifiers to speed production, cut waste, reduce costs. Explains magnification, working distance, fields of view for all types. Write: Bausch & Lomb Optical Co., 50407 Bausch St., Rochester 2, N. Y.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

. . . **Decentralization, from page 111**

continue to flow to the fighting fronts. With certain procurement personnel also stationed at the base, the supplies also would be replenished without directives from Headquarters. In the event one depot was wiped out, it has a counterpart in another section of the country.

Expansion in the future has long been a nightmare of Headquarters planners. Wright-Patterson now has 36,000 military and civilian workers, who not only strain the capacities of the cafeterias and present buildings, but make the short rides from nearby communities to the base a tiring and lengthy drudgery for all.

Of course it would be possible to construct more buildings and cafeterias. An expansion personnel-wise in the Dayton area, however, would present problems in that the Air Force and the concentration of other industries in the Dayton area would be competing in one labor area for the same persons.

Air Force expansion, when scattered over 15 depots, however, would not present this labor problem should quick expansion be necessary. A survey shows most installations can stand some personnel expansion without any increase of facilities.

The question arises: If prime responsibility for all the supply classes is decentralized to 15 prime depots, who and what is left at Headquarters?

Headquarters planners have long been cognizant of the welter of paper work handled at Wright-Patterson.

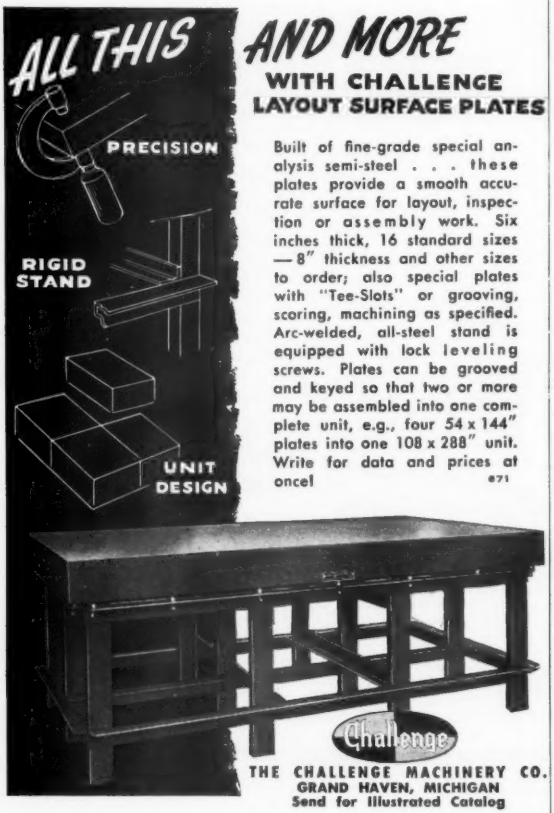
With actual details of buying, receiving, storing, shipping and maintaining supplies removed from Headquarters, it will be possible for those remaining to concentrate on policy, planning and management. This undoubtedly will strengthen the policy-making functions at a time when strength will be needed most.

The Air Force, the fastest growing of the three armed services, already has become the largest industry in the country. AMC, as the logistics backbone of the air service, therefore is the biggest buyer and supplier in the nation.

An operation of this size cannot be run inefficiently. There must be long-range planning and careful management if the billions of taxpayers dollars is to be used wisely.

General Rawlings said decentralization would bring about better planning, better policies and wiser management.

Before the decision to decentralize was made, General Rawlings pointed out, a careful study had been made, not only of AMC operations, but also of man-


ALL THIS
AND MORE
WITH CHALLENGE
LAYOUT SURFACE PLATES
PRECISION
RIGID STAND
UNIT DESIGN
Built of fine-grade special analysis semi-steel . . . these plates provide a smooth accurate surface for layout, inspection or assembly work. Six inches thick, 16 standard sizes — 8" thickness and other sizes to order; also special plates with "Tee-Slots" or grooving, scoring, machining as specified. Arc-welded, all-steel stand is equipped with lock leveling screws. Plates can be grooved and keyed so that two or more may be assembled into one complete unit, e.g., four 54 x 144" plates into one 108 x 288" unit. Write for data and prices at once!
671
Challenge
THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN
Send for Illustrated Catalog

ment of large industries. It was noted that Sears, Roebuck and Co., General Motors Corp., and the Ford Motor Co. have been decentralizing their operations for several years.

A 10-man committee was appointed under Maj. Gen. William H. Tunner, deputy commanding general, to study the problem. The committee was assisted by Kinley D. Tracy, of Robert Heller and Associates, management consultants of Cleveland, Ohio. The committee included representatives of Headquarters USAF, Headquarters AMC, Air Materiel areas and the Air Procurement Districts.

After months of study, the committee recommended that a number of supply, maintenance and procurement operating functions and their supporting activities be removed from Wright-Patterson Air Force Base.

The plan, details of which still are being worked out, is considered by General Rawlings as the best solution to prevent AMC Headquarters from becoming a vulnerable red-tape ridden installation.

★ ★ ★

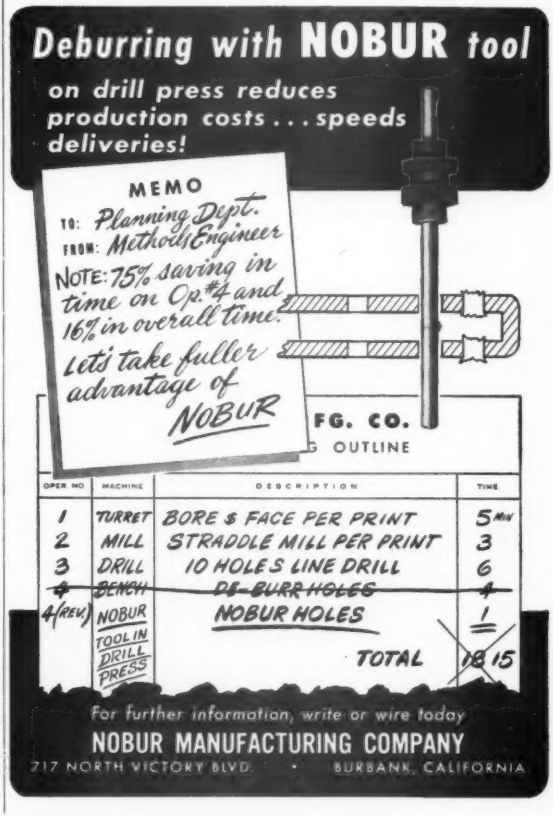
Gorham Tool Co.

George N. Popham, vice president and sales manager of Gorham Tool Company, Detroit Cutting Tool manufacturer, was recently honored at a luncheon marking his twenty-fifth year with the company. Mr. Popham joined Gorham Tool in 1927. He became sales manager in 1935, and was appointed vice-president in charge of sales in November 1941. Shortly afterward he was appointed to the Board of Directors.

Don T. Flater, Gorham president, cited Mr. Popham's accomplishments in building an organization of representatives and distributors throughout the United States, and in bringing the company to a point where it is now one of the nation's foremost in the field of designing and manufacturing special and standard cutting tools and wear resistant parts.

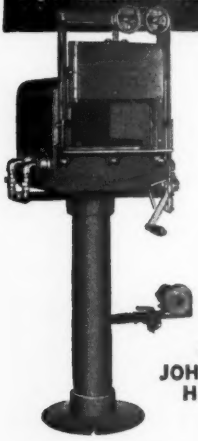
Clamps For Welding

A unique welding fixture utilizing De-Sta-Co portable toggle clamps has been designed by the Steel Cooperage Division of the Serrick Corp. The fixture holds four rectangular and three round engine manifold flanges to an alignment plate during an inert arc welding operation prior to final stainless steel welding. A "V" type prong replaces one clamping jaw on three of the twelve model #468 portable toggle clamps used, to provide additional gripping area on the manifold stamping. Precise alignment is important because the flange openings must fit on machined engine block studs. After the tack weld application the manifolds are transferred to the final operation, where the flanges are arc welded with a stainless steel rod. Approximately 54 manifolds are completed per fixture during an eight hour shift.


Deburring with NOBUR tool
on drill press reduces production costs . . . speeds deliveries!
MEMO
TO: Planning Dept.
FROM: Methods Engineer
NOTE: 75% saving in time on Op. #4 and 16% in overall time.
Let's take fuller advantage of NOBUR
FG. CO.
OUTLINE
OPER. NO
MACHINE
DESCRIPTION
TIME
1 TURRET BORE & FACE PER PRINT 5 MIN
2 MILL STRADDLE MILL PER PRINT 3
3 DRILL 10 HOLES LINE DRILL 6
4 BENCH DE-BURR HOLES 4
4(REV.) NOBUR TOOL IN DRILL PRESS NOBUR HOLES 1
TOTAL 18 15
For further information, write or wire today
NOBUR MANUFACTURING COMPANY
217 NORTH VICTORY BLVD. • BURBANK, CALIFORNIA

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

SAVE HOURS
CUT HEAT TREATING COSTS



Quick Acting
JOHNSON No. 130A
Hi-Speed Furnace

Save time, save gas... heat treat carbon and high speed steels, dies and tools with JOHNSON 130A. Powerful burners provide fast uniform heat with time saving speed. Gets the job done while other furnaces are still warming up. Two sizes offer wide temperature range for any steels. Temperatures easily regulated with accuracy. Counterbalanced door opens upwards. Firebox 7"x13"x16½" lined with high temperature refractory. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

For temperature range
1400° to 2350°F_____$295.00

For temperature range
1800° to 2400°F_____$325.00

F.O.B. Factory

Models available in smaller firebox sizes. Write for Free Catalog.

JOHNSON GAS APPLIANCE CO.
575 E Ave. N.W., Cedar Rapids, Iowa

Since 1901 **JOHNSON**
FURNACES FOR INDUSTRY

. . . Free Cutting Copper, from page 124

Table IV

Recommended Feed for Drilling [8]

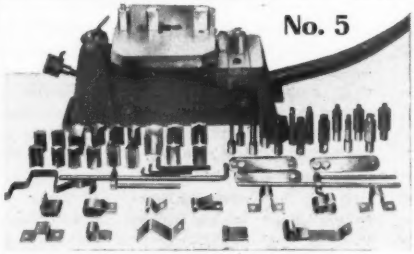
Hole Diameter, Inches	Feed in Drilling, Inches Deep Holes	Shallow Holes
0.020		0.0015
0.040		0.002
1/16		0.004
3/32	0.005	0.012
1/8	0.005	0.015
3/16	0.010	0.020
1/4	0.010	0.014
5/16	0.010	0.016
5/8	0.010	0.016
Center drills under 1/8		0.003
Center drills over 1/8		0.006

taining from 5 to 10 percent lard oil can be employed in the machining of the higher copper leaded alloys such as the high brasses and copper alloys. Usually, when the latter type oil mentioned is employed, a better finish combined with good tool life is normally experienced.

In conclusion, it can be stated that the requirements of each individual job will vary; thus, such factors as lay-out, tool materials, tool types, speeds, feeds, depth of cut, lubricant, and condition of equipment will vary in different localities, resulting that in the machining of a specific part of identical compositions, practice will vary. The machinability of the leaded copper base alloys, especially that exhibited by free-cutting yellow brass, has lead to the use of this material whenever feasable.

References:

1. 'Materials and Machinability', F. R. Boulger, Symposium on Machining Theory and Practice, American Society for Metals, Cleveland. 1950 ed.
2. 'Machinability of Copper Alloys'. D. K. Crampton. Metal Progress, Vol. 46, Aug. 1944, p 275.
3. 'Copper Alloys containing Sulfur, Selenium and Tellurium', C. S. Smith, Trans. A.I.M.E., Vol. 128. 1938, p 325.
4. 'Effect of Tellurium on Copper Base Alloys', H. L. Burghoff and D. E. Lawson, Trans. A.I.M.E., Vol. 128, p 315.
5. 'Free Cutting Brass, Bronze and Copper', Chase Brass and Copper Co., Waterbury, Conn.
6. 'How to get Maximum Production from Single Spindle Automatics', W. E. Rollins, Machinery, April 1951, p. 166.
7. 'How to Machine Copper Alloys', Lester F. Spencer, American Machinist, Oct. 29, 1951, pp 109-123.
8. 'Machining Copper and Copper Base Alloys', The American Brass Co., Waterbury, Conn.



WRITE FOR DESCRIPTIVE CIRCULAR

Multiform BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to 3/16" x 1½" as illustrated, other models up to ½" x 4".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

HARDENED and GROUND HSS BLANKS

Any decimal diameter to ⅝"—in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

Write or Phone ORange 3-4301 for price list D-3

WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

NEW LEITZ TOOLMAKER MICROSCOPE

...PRODUCES HIGHEST PRECISION
....CUTS INSPECTION TIME

The NEW LEITZ DESIGN checks angular measurements in degrees and minutes.

Contains all Thread Templates for U.S. National thread profiles 6-80 pitch.

Contains Radii Templates from 21/64" to 13/16" by 1/64". Concentric circles from .010" to .280" by .010" and one blank compartment.

NOTE: TEMPLATES CAN BE OBSERVED IN 3 MAGNIFICATIONS: 10X - 20X - 30X

BE SAFE — SEND FOR LATEST BULLETINS

GEORGE SCHERR CO., Inc.
COMPLETE LINE OF PRECISION INSTRUMENTS
200-T LAFAYETTE ST. • N.Y. 12, N.Y.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

A. S. B. E. Annual Convention

The American Society of Body Engineers have formulated plans for their Seventh Annual Technical Convention to be held at the Rackham Memorial Building, 100 Farnsworth Avenue, Detroit 2, Michigan, on Wednesday, Thursday, and Friday, October 29th, 30th and 31st, 1952.

Exceptional displays are being arranged by leading suppliers and parts manufacturers in the Automotive Industry. They will show their newest products and the methods used in developing them. The diversification of ideas and materials in the various booths will provide interest and education to laymen and engineers alike. Mr. John Walter, Industrial Designer, has been chosen as General Chairman of the Convention by the president of the A.S.B.E.

Fastener Standards

A new 256-page book entitled Bolt, Nut and Rivet Standards has just been published. It is the only current publication that contains all today's standards for commercial fasteners, and is extremely valuable as an aid to production in manufacturers plants and as a service to general users.

New Standards included are those for round head bolts, slotted and recessed screws, socket head screws, small solid rivets, large rivets, unified screw threads, and the newly adopted square and hexagon bolts and nuts unified dimensionally with Britain and Canada. A large section lists weights and stock production sizes, discussions on screw threads and gaging practices, and a complete list of all recognized fastener specifications.

WAR SURPLUS SAVINGS
SAVE UP TO 85% ON TOOLS-MACHINERY AND PARTS!!
1952-230 PG. CATALOG
Our latest & biggest CATALOG of NEW and SURPLUS BARGAINS. Thousands of items at UNHEARD OF LOW PRICES! SAVINGS UP TO 85% in Hand & Power Tools, Electrical Supplies, Industrial Machinery, Gas & Electric Motors, Winches, Hoists, Machine Tools, Gauges, Welding Equipment, Pneumatic & Air Tools, Raw Stocks, Aluminum, Brass, Copper & Steel in Sheets, Bars, Rods, Tube & Extrusions, Nuts, Belts, Rivets, Screws, Wire, Cable & a Huge Stock of HYDRAULIC SUPPLIES including Cylinders, Valves, Pumps, Motors, Fittings, Tubing, etc. While these items last we will continue to sell them at typical low Pulley Prices. WRITE TODAY FOR YOUR COPY!
Stationary or Portable
ARC WELDER
Delivers 300 Amps., continuous – or 350 to 400 Amps., intermittent
Designed to weld continuously for hours . . . This unit is built around a rugged, heavy duty, aircraft type generator and comes complete with pulley reactor, output controls, switches and 8 rheostat mounted on sturdy steel frame. Operates on 15 H.P. for maximum output. Gas or electric motor. For light or heavy industrial work.
97.50
HYDRAULIC PUMP & CYLINDER SPECIALS
Hyd. Variable Displacement PUMP
Will deliver maximum volume at any pressure setting between 600 and 900 P.S.I. Pump housing serves as reservoir for system. Has built-in compressed air super-charger which makes system independent of outside atmospheric pressure. Rotation is left hand only. Maximum speed for continuous duty is 3750 R.P.M. Displacement is .484 cu. in. per revolution. or approximately 4 G.P.M. at 1750 R.P.M. 32.50
Special! HYDRAULIC CYLINDER
Gives 20,000 lbs. thrust (push or pull) using 1500 PSI line pressure as obtained from our hydraulic pumps. Will produce up to 40,000 lbs. thrust with 3000 PSI. Can also be used on low pressure air systems. 4" bore; 18" stroke; 30½" length. Ideal for road – farm – shop machinery, etc.
29.95
P-3 STRATO POWER PUMP
With built-in variable flow control valve in head. Positive displacement piston type. Displacement capacity: 2 gal. per min. at 1500 RPM at 1250 PSI. Pressure limit 1250 PSI continuous. 1400 PSI for 15 sec. Operates at 3750 RPM, intermittent max. 4500 RPM. Rotates either direction without adjustment . . 19.50
No. 3 HYDRAULIC CYLINDER
Double action. Bore is 1" – Shaft ½". Has stroke of 2½" to 4". Stroke can be adjusted with internal sleeve stops. Overall length is 8½". Will take 1500 lbs. continuous duty. 3000 lbs. intermit. Will lift or push up to 1100 lbs.
5.75
P-4 VICKERS ANGLE PUMP
Positive displacement type, angle piston. Displaces .507 cu. in. per revolution. Has capacity of 6 gal. per min. at 3000 RPM at 1500 PSI, continuous, 1875 for 15 sec. Operating speed of 3750 RPM, intermittent maximum, 4500 RPM. Rotates to the right only.
19.19
FOUR WAY VALVE
Poppet type. Pressure balanced. Off at neutral position. Piston type with built-in relief valves for limit of cylinder strokes. 5/8" AN tube size (7/8"–14 thread) inlet & outlet. Parts to cylinder are 1/2" AN tube size 3/4"–16 thread).
9.75
PALLEY SUPPLY CO.
DEPT. TD-7
6321 SAN FERNANDO RD.
GLENDALE 1, CALIF.
Order from this ad. All sales final. All prices F.O.B., Glendale. Pay by M.O. or check. P.O.'s accepted from D.&B. firms. ½ deposit with C.O.D.'s.

Cushman Chuck

After a continuous association of almost thirty years with the Cushman Chuck Company, of Hartford, Mr. Harry W. Hultgren, of 473 South Main St., West Hartford, Conn., is retiring from his position as sales mgr. of the company, effective May 9, 1952.

During his entire career with the concern, Mr. Hultgren has been engaged in sales work on the company's products of lathe chucks and related devices, which have a world-wide sale to general industry through machine tool builders, machinery dealers and mill supply houses. Entering the employ of the company October 1, 1922, Mr. Hultgren spent the next fifteen years in extensive travelling. During these travels he became very well known in machine tool circles, where he numbers many friends. While Mr. Hultgren is retiring from active service with the company, he is still being retained on an inactive basis in the capacity of sales consultant.

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

Chrysler Scrap Drive Rounds Up Vital Metal

In Detroit today, scrap metal is no longer just plain scrap; it's one of the auto industry's most vital products. Defense requirements have created an unprecedented demand for more scrap to make more steel.

Chrysler Corporation set up a salvage organization to 1. Gather all dormant scrap available in obsolete tools, dies, jigs, and fixtures no longer needed for service production; 2. Speed collection and use of production scrap metal; and 3. Assist dealers to route scrap from service shop to steel mill.

More than 16 million pounds of extra scrap was found in the first nine months of the drive. The flow of leftover metal from stamping, machining, and casting operations was speeded up.

At the main plants in Detroit, a special staff of scrap-hunters organized a thorough search for unneeded metal. Largest source of this was obsolete tooling, which often is held for years to produce replacement parts for past model cars. While it is necessary to hold some of this for service production, the company believed that much of it could be eliminated.

Chrysler-owned obsolete tooling was held by venders all over the country. Normal routine required that obsolescence lists be supplied the MoPar Division, which is responsible for service production and its tooling. Considering the perishable nature of a part, the volume of demand, and the adaptability of a current part to use on prior models, the MoPar Division decided which tooling must be kept and which could be scraped.

In a move to accelerate disposition of tooling, these steps were taken:

1. All duplicate tooling except that held by one vendor is scrapped.

2. If this vendor has duplicate dies, all but one set are scrapped.

3. When service sales of a part have fallen off, and a later model part can be used, the tooling is scrapped.

Obsolete part numbers are reviewed at the rate of 2500 per month. Release of tooling has reached nearly one million pounds per month. With the tremendous number of part numbers in existence, this process can go on indefinitely.

BARNES WAVY SET BAND SAWS

CUT THIN SECTIONS WITHOUT STRIPPING OF TEETH!

Barnes wavy set blades are especially designed to cut thin sections without stripping. Each tooth removes its proportionate share of metal without taking the shock of a full cut. This distribution of shock load prevents stripping—assures efficiency for which Barnes Blades are famous. Used on all Band saw machines—you can depend on Barnes all ways.

YOUR DISTRIBUTOR CARRIES A FULL STOCK OF BARNES SAWS

BARNES

ESTABLISHED 1919

W. O. BARNES CO., INC.

1297 TERMINAL AVE. • DETROIT 14, MICH.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Carbide Shearing Die Inserts Trim Six Surfaces on a Steel Casting

Successful use of shear blocks of Carboloy cemented carbide for trimming of flash from steel castings in production is reported by Oliver Corporation of Shelbyville, Illinois.

The shear blades are used on a progressive die in a crank press in which mower blade guards (Fig. 1) are respectively pierced, riveted and trimmed (as indicated by lines, Fig. 1)

The shear die originally had two steel trim blocks, one on each side of the die, to simultaneously shear six faces varying in length from ¼ to ⅝", three on each side of a SAE 1045 casting.

Tool life of the trim blocks, relative to the other tools in the progressive die, was comparatively short and they had to be changed at the end of each day (12,000 pieces). The use of Carboloy cemented carbide on the cutting edges of the trim blocks proved to be the answer to the problem.

The original trim blocks were altered to receive the inserts by grinding a step in each (Fig. 2) and the inserts, of Carboloy Grade 55A tungsten carbide, were then brazed on the steps at intervals along each block to correspond with the casting faces to be sheared.

The blow is taken on the ¼" face of the inserts and because the parts are not stripped, there is a 1/64" over-hang of the carbide to provide free clearance to facilitate removing the part before the die head moves back to the top. No difficulty has been encountered from this supported over-hang.

With the carbide blocks tool life of the shearing die has been increased to well over 100,000 pieces between grinds. Very little grinding is needed at the time of sharpening and there has been no sign of the cutting edges being chipped or broken under the continuous impacts.

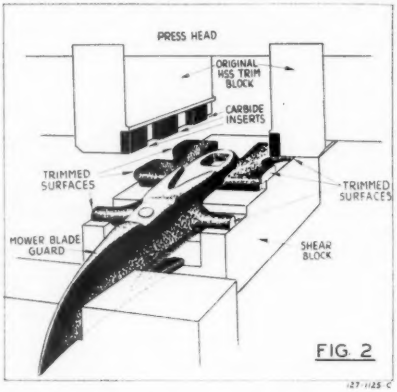
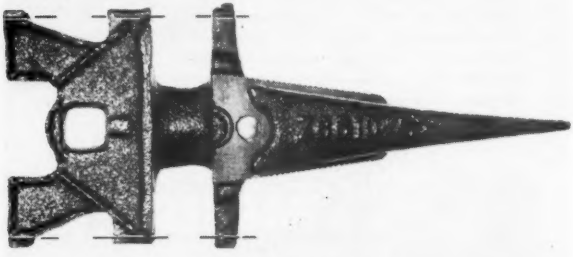


Fig. 2. A line drawing of the part in shearing position in the die showing the carbide inserts that are brazed in steps in the original steel trim blocks.



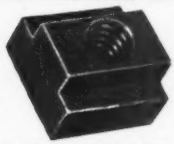
----CASTING SHEARED AT THESE 6 PLACES SIMULTANEOUSLY WITH CARBOLOY CEMENTED CARBIDE SHEAR BLOCKS IN A CRANK PRESS

FIG. 1

Fig. 1. A view of a cast steel mower blade guard with dotted lines indicating surfaces that are trimmed in a shearing die with Carboloy Grade 55A tungsten carbide inserts.

Photos courtesy Carboloy Dept., General Electric Co.

SEND FOR FREE CATALOG TODAY



QUARTER TURN SCREWS
SHOULDER SCREWS
DOUBLE END JIG FEET
SCREW TYPE JIG FEET
PRESS TYPE JIG FEET
FLANGED NUTS
CUT THREAD STUDS
TEE-NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
STAR TYPE HAND KNOBS
HEXAGON TYPE HAND KNOBS
KNURLED HEAD SCREWS

T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

Northwestern
116 HOLLIER AVE., DAYTON 3, OHIO

EISLER JIG BORING
CAM MILLING

A SPECIALIZED ROWBOTTOM CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION ...EXPERIMENTAL DEVELOPMENT

EISLER ENGINEERING CO., INC.
732 S. 13th Street (Avon Ave.)
Newark, N. J.

For PRECISION FINISHES on CARBIDE, TOOLS, DIES, Etc.
and
MIRROR FINISHES
. . . in minutes Instead of hours
"MICRO MESH"
PURE DIAMOND LAPPING COMPOUND
WILL SOLVE YOUR
LAPPING PROBLEMS
write for details

A-1 ABRASIVE LABORATORIES
139 DUANE STREET NEW YORK 13, N. Y.

SOLD THRU LEADING SUPPLY HOUSES

GROBET CHATTERLESS COUNTERSINKS
Six staggered cutting edges give shearing cut that eliminates all chatter.
SEND FOR CATALOG AC1.
GROBET FILE CO. of AMERICA, INC.
421 CANAL STREET N. Y. 13, N. Y.
Plants: New York, Chicago, Montreal

Every tool room needs Champion
"HI-ROCKWELL" DRILLS

These tools drill precision holes in steels testing C-40 to C-68 Rockwell quickly, cleanly and without annealing. Ideal for reworking tools and dies. They actually cut a curled chip.

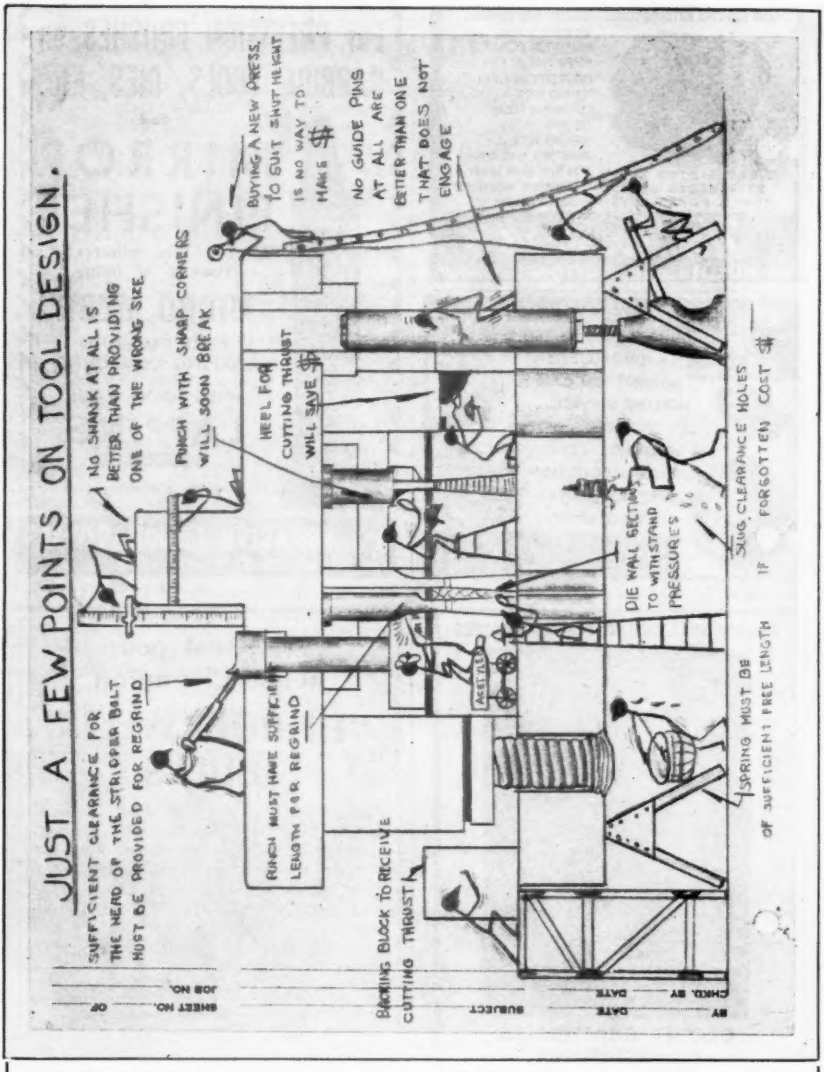
CHAMPION "HI-ROCKWELL" drills have reduced the drilling (a costly job), of that "forgotten hole" in an expensive hardened die fixture or plastics mold.

AVAILABLE IN STANDARD SIZES FROM STOCK

Write for free booklet.
We also manufacture the NU-MIKRO piston grooving tool.

CHAMPION TOOL CO.
BOX 463 — FARMINGTON, MICHIGAN

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS


JUST A FEW POINTS ON TOOL DESIGN.
SUFFICIENT CLEARANCE FOR THE HEAD OF THE STRIPPER BOLT MUST BE PROVIDED FOR REGRIND
NO SHANK AT ALL IS BETTER THAN PROVIDING ONE OF THE WRONG SIZE
PUNCH WITH SHARP CORNERS WILL SOON BREAK
HEEL FOR CUTTING THRUST WILL SAVE $
BUYING A NEW PRESS TO GIVE SHUT HEIGHT IS NO WAY TO MAKE $
NO GUIDE PINS AT ALL ARE BETTER THAN ONE THAT DOES NOT ENGAGE
PUNCH MUST HAVE SUFFICIENT LENGTH FOR REGRIND
BACKING BLOCK TO RECEIVE CUTTING THRUST
DIE WALL SECTIONS TO WITHSTAND PRESSURES
SLUG CLEARANCE HOLES
SPRING MUST BE OF SUFFICIENT FREE LENGTH
IF FORGOTTEN COST $
SHEET NO. OF
JOB NO.
SUBJECT
BY DATE
CHKD. BY DATE

This little piece of "industrial art" has been kicking around Cleveland die shops for several years. It has started many an apprentice off in the right direction. Our thanks to Larry Nadsady of Atlantic Tool & Die Company for a copy to reproduce for you. W. N. N. Tech. Ed.

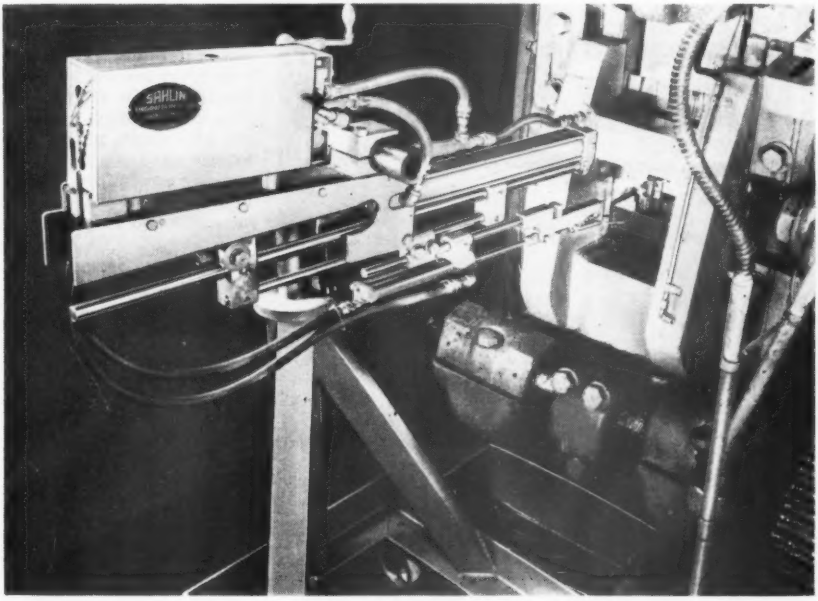
Portable Unloader Facilities Unloading Small Parts

As companion equipment to its swinging-arm type automatic unloaders, the Sahlin Engineering Company, has developed a new portable unloader which can be wheeled up to small and medium size presses for automatic removal of small parts. The machine, which consists of the same jaw, air cylinder and electric control assemblies used on Sahlin Iron Hands, can be adjusted up and down to reach various die levels and be set at any angle required. Jaw travel is in a straight line and is especially suited for the removal of small parts at high speed. Due to its portability, high speed and safety features, the new unloader is expected to find wide usage on applications where it is impractical to eject parts mechanically or through a bed opening or by gravity.

The unloader is mounted on a heavy steel frame which rides on four caster-type wheels. A built-in locking device is provided. Because the machine is mobile, it is particularly suited to job shop work or short runs, as it can be kept in continuous service by moving it from one press to another.

Operation of the new unloader is as follows: When the ram descends and completes the forming or shearing operation, the steel jaw moves into the die and takes a firm hold on the stamping the moment the ram rises sufficiently. The jaw lifts the stamping, moves back out of the die and drops the stamping in a tote box or on to a conveyor. It then returns to its original position to await the next cycle.

Gripping jaw designs of various types are available for a variety of special unloading conditions. They include a hook type for application where a gripping edge is lacking; a neoprene-tipped grip to protect parts with special finishes; a pivot-type which can be swiveled laterally to clear tight die areas; and a confined type which locks a vertical flange stamping without damaging edges.



U S S Nautilus to be Powered by Westinghouse Atomic Engine

Under contract with the Atomic Energy Commission and the Navy Department, the Westinghouse Electric Corporation is building both the nuclear reactor, or atomic "boiler", and the associated propulsion equipment for the U. S. S. Nautilus, atomic-powered submarine whose keel was laid June 14 at Groton, Conn. The submarine will be built by the Electric Boat Division of the General Dynamics Corporation.

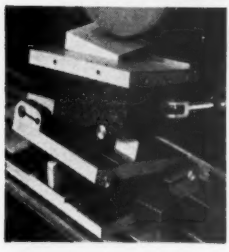
The keel laying came three and one-half years after Westinghouse first was assigned the job of building the first "atomic engine". It was on December 29, 1948, that the Atomic Energy Commission announced that a contract had been entered into with Westinghouse "for the construction of an experimental nuclear reactor to meet specifications for eventual use for ship propulsion". The detail design is being carried out jointly by the Argonne National Laboratory of the United States Atomic Energy Commission and Westinghouse.

Although the work has been cloaked in silence, Westinghouse has been able to report "considerable progress" in this major engineering assignment. Research, design, and production work still is going on today at the Bettis Field site near Pittsburgh. A "land-based prototype" of the atomic engine is being built at the National Reactor Testing Station near Arco, Idaho. This experimental model is the basic pattern for the unit Westinghouse has been selected to build for installation in the U. S. S. Nautilus.

The land-based prototype consists of a nuclear reactor, all its controls, the water for extracting heat from the reactor, and the means for converting this heat energy to power. This steam propulsion system follows marine practice except for measures taken to reduce dimensions and weight.

The work by Westinghouse, Argonne, and participating industrial firms already has produced a number of first-grade technical accomplishments that are side issues of the reactor itself; achievements of lasting value which, sooner or later, can be disclosed for the general benefit of our industrial society. These include development of new materials and increased knowledge in the fields of corrosion and heat transmission.

ANGULAR SET-UPS
to gauge-block accuracy
IN A FEW MOMENTS



the Magna-Sine

Any angular set-up, single or compound, takes only the time to look up the angle in the Robbins Table of Constants and to insert the indicated gauge blocks between the Magna-Sine plates. It's fast—it's positive, to gauge-block accuracy. Work is held by magnetic attraction. In two models and two sizes; also in non-magnetic models for inspection work.

SEND FOR FREE CATALOG TODAY

OMER E. Robbins COMPANY
Manufacturers of the MAGNA-SINE and Other Precision Tools
5722 TWELFTH ST. • DETROIT 8, MICH.

One of the toughest problems of design of this nuclear power plant, Westinghouse engineers explain, was to find suitable materials with which to construct the reactor core. These materials must have the proper strength at the operating temperatures, they must not deteriorate under intense radiation, and they must not absorb too many of the precious neutrons. Every material used, every part built, must be examined with great care in the light of the unusual operating conditions. This means the analysis of behavior of conventional materials and also of strange new materials when they are exposed to nuclear radiation, and when they encounter other heretofore unknown conditions.

Classified models and full-scale mock-ups, many of transparent plastic, set up at the Argonne National Laboratory and at Bettis Feld, have been of invaluable help in determining how well parts go together and also in enabling the engineers and technicians to visualize the mechanical elements, many of them the first of their kind.

Atomic energy problems are not new to Westinghouse. The Company entered the field of nuclear research as far back as 1937 with construction of a giant 90-ton atom smasher, the first such machine built by an industrial company for investigation of nuclear physics problems. In 1942, Westinghouse laboratories at Bloomfield, N. J., were the first to produce pure uranium by the ton for the early atomic bomb experiments and the atomic pile at the University of Chicago. During this period, production of equipment for rapid production of the atomic bomb became a vital task for Westinghouse. The Company produced more than $53,000,000 worth of special equipment and half again as much in standard items for work on a technique of separating U-235 from U-238.

These efforts prepared hundreds of Westinghouse scientists and engineers for the job that is showing results today—the United States' first atomic-powered submarine.

★ ★ ★

The National Tool & Die Manufacturers Association's recent survey reveals a near record backlog of unfilled orders for special tools, dies, jigs, fixtures, gages, molds, and specially designed machines. This stands at four times the backlog of two years ago.

Morton
FIXTURE CLAMPS AND DETAILS . . .
Send for complete Catalog. Includes full size tracing templates.
Typical application of Jack Lock being used to support section of casting during machining operation. This is one of the numerous applications of this positive, vibration proof, non-distorting Jack Lock.
MORTON MACHINE WORKS
2421 WOLCOTT STREET • DETROIT 20, MICHIGAN

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Mortar Shells Bored and C'Bored at High Speed

Increased production is attained in boring and counterboring operations on 4.2 inch chemical mortar shells with the recently developed boring machine illustrated. Capable of turning out 56 parts per-hour at 100% efficiency, the machine is of the high speed, heavy duty, two spindle inverted type, utilizing hydraulic feed. The machine uses No. 6 Morse taper drills with provision for use of pick-off speed change gears.

Operations include chucking two shells; locating shells over spindles from fixed vee blocks, one at upper and lower end of each shell; bore 3.73 inch diameter hole to 15 inch depth of cut; and counterbore 3.73 inch diameter hole to 7/16 inch depth of cut.

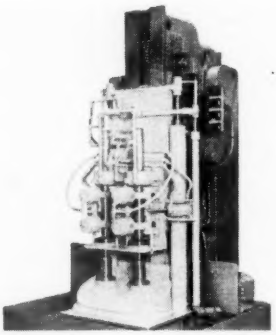


Photo courtesy Baker Brothers, Inc.

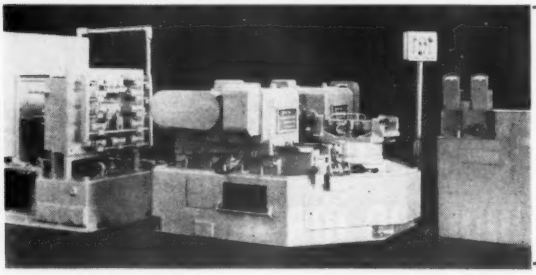
Milling Machine For Weight Balancing of Connecting Rods

Connecting rods are accurately balanced on a special weight standardizing milling machine designed by The Motch & Merryweather Machinery Company, in cooperation with the Toledo Scale Company. This automatic-cycle machine removes enough metal from each end of a connecting rod to keep balance of the rod within 2 grams.

The operator first places an overweight connecting rod on the weight-scale unit. The amount of overweight on each end, relative to a fixed point of gravity, is electrically transmitted to the milling head units, where mechanical stops are automatically positioned and held.

The weighed rod is then loaded by the operator in the vacant one of two work-holding fixtures on a rotary index table. On automatic cycle, the table rotates 180° to the work position. Two milling heads approach to the piece and stop, while locating probes advance until they contact the piece. Milling head quills and face cutters continue to advance the additional amount necessary to remove the amount of metal from each end so as to bring the connecting rod within weight balance.

Either high speed steel or cemented carbide cutters can be used. Lubrication of all moving parts is automatic. Movement of milling heads, probes, and quills; rotating of index table; and clamping of fixtures are accomplished hydraulically. All hydraulic and control units conform to J.I.C. standards.



Two opposed quill-type milling heads, mounted on hardened ways, flank the reciprocating rotary-index table. Weight-scale transmitting unit is shown at right. External hydraulic tank, motor, pump, and control panel are shown at left.

Photo courtesy
Motch & Merryweather.

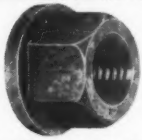
EXTRA HARD EXTRA TOUGH

for Millers Duplicators Die Sinkers Pantographs

BLACK STRAND Cutters-Blanks

Write for Literature and Prices
EDWARD D. STRAND COMPANY
Box 54, West Side Sta., Worcester, Mass.

SEND FOR FREE CATALOG TODAY



T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

QUARTER TURN SCREWS
SHOULDER SCREWS
JIG FEET (3 TYPES)
SPHERICAL WASHERS
LATCH BOLTS
FLANGED NUTS
CUT THREAD STUDS
TEE NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
CAST IRON HAND KNOBS
FIXTURE KEYS
KNURLED HEAD SCREWS

Northwestern
116 HOLLIER AVE., DAYTON 3, OHIO

Fast, Accurate Measurements
With the AMIC "Quick-Action"
Vernier Caliper

AT NEW LOW PRICES

The perfect tool for machine shop, tool room inspection and Quality Control. A flick of the thumb and you've got your external and internal dimensions. Knife-edged hardened jaws provide exact thread measurements. A depth gage blade gives speedy measurements. AMIC designed and made exclusively for AMIC by an outstanding European manufacturer.
Scientifically engineered, painstakingly machined, packed in a sturdy leatherette case. A tool without rival.
Size 6" #21B, Graduation 1/40", vernier reading .001.
#22B, Graduation 1/40" and full MM, vernier reading .001 and 1/10 MM.
Write for Circular A. Dealers inquiries invited.

AMERICAN MEASURING INSTRUMENTS CORP.
AMIC BUILDING
21-25 44th Ave., Long Island City, N. Y.
TELEPHONE: EXeter 2-0002

KOPING LATHES

Famous for PRECISION PERFORMANCE LONG LIFE

Since 1856, Koping Lathes have offered machinists the world over the finest in engine and tool room lathes. These smooth-running, vibrationless machines, made of finest Swedish steel and raw materials, are considered equal to the best in the world market.

- 16", 20", 24", & 32" sizes.
- Cuts 271 different threads.
- Cuts American and Metric threads.
- 18 different spindle speeds.
- Exceptionally powerful, sturdily built.

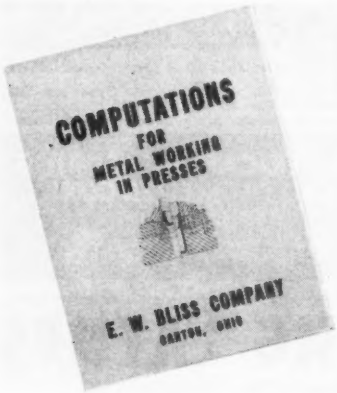
For Information and Specifications, write:

AMERICAN PULLMAX CO., INC.
2469 North Sheffield Avenue, Chicago 14, Illinois

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Bliss Revises Manual of Press Work Computations

A comprehensive compilation of engineering data, of unusual value to many manufacturing executives and shopmen—including pressroom superintendents, production planners, equipment engineers, and others—is offered in a newly revised 52-page manual. Issued by E. W. Bliss Company, "Computations for Metal-Working in Presses" (Bulletin 38) presents the essential data for properly selecting a press type and size well-suited for a particular operation.



Sections of the manual refer to a specific class of presswork—blanking and shearing; drawing and reducing; ironing; coning, sizing, and forging; and extrusion. Included is the necessary data for computing job requirements, pressure capacity and sustained work capacity of various mechanical and hydraulic presses. A series of alignment diagrams for ease in making these computations has been prepared from such formulae as could be developed. Some of the formulae are theorectically accurate. Others are empirical, or are approximations which are sufficiently close for engineering purposes.

The selection of suitable mechanical press equipment involves consideration of the press strength, or tonnage capacity; the energy available, or flywheel capacity; the speed of ram travel; the size of the motor and horsepower required. Here again, general formulae and recommendations are offered

Supplementary information includes helpful tables that show properties of various commonly-used presswork materials, comparative sheet metal and wire guages, approximate diameters of blanks required for shells of specific height and diameter.

★ ★ ★ ★ ★ ★

NPA Official Cites Importance of Tooling Industry

Franz Stone, Deputy Administrator of the National Production Administration, told the Board of Trustees of the National Tool & Die Manufacturers Association at a recent Washington meeting, that recognition of the need to expand and strengthen the contract tool and die industry hand in hand with the development of the machine tool industry was now clearly established.

"After years of indoctrination," he said, "we in government now know that it avails you nothing to have a strong machine tool program unless you also provide for the dies, jigs and fixtures without which machine tools can't function."

Tooling and development orders for aircraft, electronic and ordnance producers, constitute the chief sources of business in the majority of the 22 tooling centers throughout the country, it was indicated at the meeting.

Randolph H. Cope, president of the association and vice president of the Bunell Machine & Tool Company, Cleveland, disclosed in a business and labor report to the Trustees that most areas have armament orders that approximate 50% to 90% of their new business. In Los Angeles, where 90% of new orders are for armament, the principal sources are aircraft, guided missile, radar, and ordnance.

ETALON No. 17 $21.95 FOB N.Y.

HARDENED STAINLESS STEEL

Known the world over for fine accuracy. Hand fitted vernier assures smooth, snug operation. COMPLETELY GUARANTEED. Supplied in ENGLISH or ENGLISH and METRIC Graduations. Furnished in handsome form fitting wooden case.

ASK YOUR DEALER or write

ALINA CORPORATION • 32 BROADWAY • NEW YORK 4, N. Y.

ONE Tool

ONE Set Up

...for boring, facing, turning recessing, undercutting

MASTERHEAD

THE BORING HEAD THAT THINKS FOR ITSELF

Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; seven models for work up to 24" diameter.

Send for Illustrated Literature

KARL A. NEISE

381-4th Ave., Dept. TP, N. Y. 16, N. Y.

YOST DRILL PRESS VISE

● This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	6	8½	23

Do you need a vise of ANY type?

Write today for bulletin on the extensive Yost line

YOST MFG. COMPANY

1000 MAIN STREET

MEADVILLE • PENNSYLVANIA

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

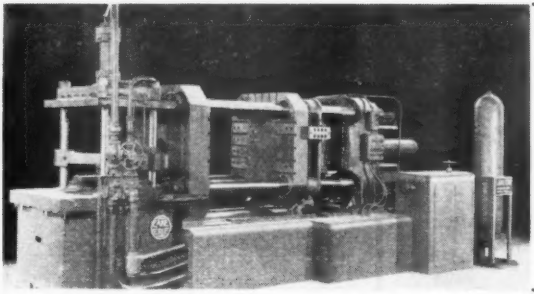
Die Casting Accelerated With Improved Machines

A recently-introduced improved line of die casting machines incorporates two exclusive features — a self-compensating toggle clamp and a pressure packing injection unit — which have permitted production increases of as much as 15% to 25%.

The toggle clamp automatically takes up clearances in the dies due to contraction and expansion of the molds during production or shut-down periods and, at the same time, engages and disengages easily without binding. This is done by using a circular cam contact surface together with rolls which guide the toggles during engagement and disengagement.

Denser castings are obtained with the new injection unit, which provides the necessary pressure to feed the shrink or compress the porosity at the time of solidification of the metal. The standard unit is arranged for 2:1 pressure increase, but higher ratios can be provided by specially-engineered units.

Other features found in the improved line are simplified maintenance of all elements; faster job setup; "jack screw" pedestal mounting of the injection cylinder for faster change-over from high or low positions of the injection sleeve; hydraulic core pulls on four sides of the platen, controlled by an electrical interlock to prevent die jam.



More uniform and denser die castings are obtained with machines featuring automatic compensation for thermal changes in molds, and pressure increase at moment of solidification.

Photo courtesy
Lake Erie Engineering Corp.

Hydraulic Press Combines Straightening and Forcing

A new C-frame hydraulic press, recently designed and built for ordnance production, is specially equipped for double-duty performance. A long table is provided for use of the press in straightening gun barrels. This table is removable, making the press usable as a general-purpose straightening press. In addition, an opening in the bed provides for use of the 75-ton press for forcing operations.

The dual hand lever is interlocked with the foot treadle—an important safety feature. The ram will not descend until both of the hand levers and the foot treadle are depressed.

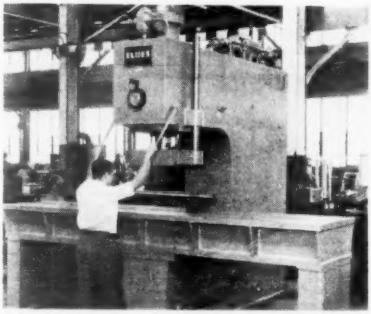
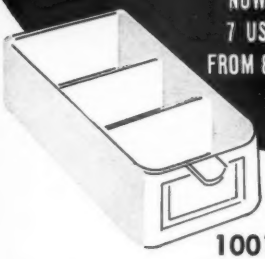


Photo courtesy
Elmes Engineering Division of American Steel Foundries.

SMALL PARTS CABINETS

NOW AVAILABLE IN
7 USEFUL SIZES —
FROM 8 TO 64 DRAWERS



1001 Time-Saving Uses For Home and Business!

Ideal for small parts...washers...nails...screws...bolts...nuts...drills ...taps...carbide tips...mounted points...tools...brads...tacks...and YOU NAME IT!

All-metal JIFFY Cabinets have a sturdy steel frame with hammered aluminum finish in silver-gray color.

Drawers are of solid aluminum, measuring 1¼" high, 2¾" wide and 5¾" deep. Individual metal drawer guides keep the drawers in a free-sliding position.

Each JIFFY Cabinet is supplied with its full requirement of removable drawer-dividers and index labels.

CLIP AND MAIL

TO: HANDY PRODUCTS
P.O. BOX 2447, CLEVELAND 12, OHIO

PLEASE SEND IMMEDIATELY THE QUANTITY AND SIZE JIFFY UNIT LISTED BELOW

☐ 64 Drw. @$24.95* ☐ 48 Drw. @$19.95* ☐ 32 Drw. @$12.95* ☐ 24 Drw. @$9.95* ☐ 16 Drw. @$7.95* ☐ 12 Drw. @$6.95 ☐ 8 Drw. @$4.95*

WE PAY ALL SHIPPING COSTS

FIRM .....

ADDRESS .....

CITY ..... State .....

ORDERED BY ..... DEPT. .....

Please Ship as Follows:

☐ Open Account, Purchase Order Enclosed.

☐ Check or Money Order Enclosed.

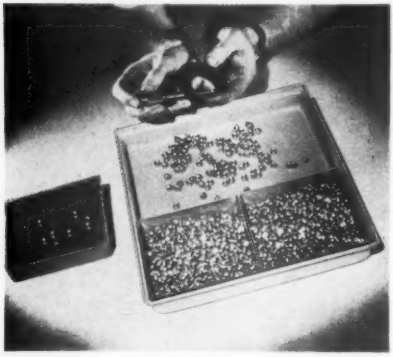
☐ C.O.D.

Ohio Customers Add 3% Sales Tax.

Color Coding for Inspection Trays

The development of all-plastic tote boxes, housings, and machine covers has been supplemented by production of a new inspection tray made of colored Boltaron.

The inspection set consists of one "pick-up tray" formed of .093 Boltaron sheeting, and is 11" x 9¾" x 1¼" deep, and three



"insert trays of .062 Boltaron, each 4½" x 4¼" x 1" deep.

The sets are available in a variety of standard colors for use in plants producing precision parts such as aircraft rivets, machine screws, electrical tube pins or any other critical part. The inspector is able, during quality control procedures, to spot check the machined parts for critical dimensions and segregate rejects into one of the colored "insert trays".

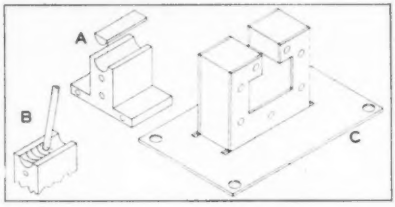
Boltaron, a copolymer plastic, was picked for the production of these units because, unlike wood, it is light weight, non-chipping, non-contaminating, resists oils, alkalies and solvents, is easy to clean, withstands rough usage and variable temperatures.

As manufactured by durable Formed Products, Inc., the new inspection tray set costs less than stainless steel as a result of using a unique molding process which also allows for variation of size for special orders.

Improved Hardfacing for Solenoid Anvils

Material conservation and higher production rates are demonstrated in a new method of applying a hard surface to anvils of solenoids. An easily effected change from silver soldering to arc welding netted a 37 percent saving in material cost and a tenfold increase in output.

Solenoids are used to operate valves, levers and other control mechanisms through movement of their laminated cores when electrically energized. The anvil, or point of contact on the core, must have Rockwell C hardness of 55-60 for optimum wearing qualities. Former practice was to silver solder a hardened steel insert into a machined groove in the anvil face, (A), production being about 100 anvils per operator per day.



A. Old method was to silver-solder hardened anvil in place.

B. New method of depositing weld metal in groove saves 37 percent in material cost and increased production tenfold.

C. Laminations for solenoids are also arc welded to sheet metal bases instead of silver soldered. Production is tripled.

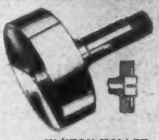
In the new method, (B), anvils are clamped end to end in a fixture and a deposit of 5 per cent chromium tool steel is laid in the groove in one pass, using Lincoln Electric toolweld A & O (air and oil hardening) shielded arc electrode. An average of 55 pieces can be faced with one pound of electrode and a single operator can turn out 1,000 anvils per day.

The solenoids are attached to 12-14 gage steel bases, (C). Here again a change from silver soldering to a single pass with a mild steel arc welding electrode resulted in tripling production with only two slight changes in stamping dies being needed to facilitate the welded joint.

SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

IMMEDIATE DELIVERY FROM STOCK

3AT, 3C
1A, 4C
5C



KLUTCH-KOLLET
Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

480
(AC-50)

All collets in hexagon, square and round.

FOR ATLAS • LOGAN • SOUTH BEND
CRAFTSMAN • SHELDON LATHES, ETC.

LEVER-TYPE DRAWBAR
½" cap.

Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!

HAND DRAWBAR
½" cap.

LIVE CENTER
(Ball Bearing) Double sealed for accuracy.

KASSON Precision

KASSON Precision products are guaranteed unconditionally for accuracy, fit and long life. Your dealer should have them . . . Write us for literature!

GENERAL DIE AND STAMPING CO.
Integrity Since 1919
264 MOTT STREET • NEW YORK 12, N. Y.

100% CONCENTRICITY AND HARDNESS TESTS ASSURE ACCURACY— SUPERFINISH BORES ASSURE LONG LIFE OF **UNIVERSAL DRILL BUSHINGS**

153

UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 8, MICHIGAN

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

New Inspection Setup Saves Many Hours on Big Welding Jobs

The technique of "hot radiography" permits the taking of X-ray photographs of large pipes, valves, and similar units at temperatures as high as 1200 F. This process, called the McElroy-McNutt hot radiography process, has been applied with considerable success to the inspection of partially completed welds on hot sections of pipe to check for possible welding defects.

Because hot radiography can be accomplished at elevated temperatures, the method eliminates several time-consuming steps necessary for the usual radiographic inspection techniques. Radiography involves taking a picture of a material by placing a sensitized film on one side of the material and a source of X-rays or gamma rays at the opposite side. With the ordinary technique, before the film can be placed on the weld, the pipe section must be cooled down to about 100F. With certain types of alloys, this cooling must be preceded by post-heating the weld to relieve internal stresses. Because of the lengthy cooling period involved, the usual practice has been to complete the weld before inspecting it.

However, hot radiography, which can be accomplished on a hot pipe, makes it practical to interrupt the welding operation to inspect the weld root where most flaws occur. This technique, therefore, saves the many man-hours of heating and controlled cooling that were formerly required before the weld could be inspected.

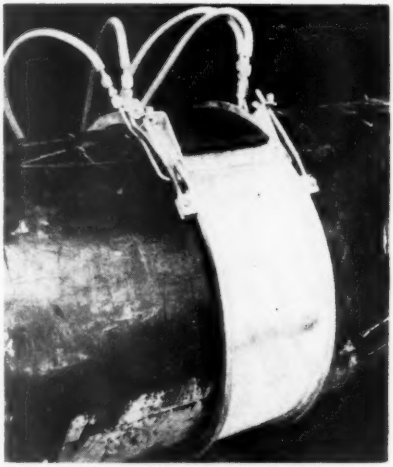


Photo courtesy Sam Tour & Co., Inc.

This special film holder permits the inspection of partially-completed welds by the McElroy-McNutt radiographic process while the metal is hot. A cooling fluid, circulating through the hollow chambers of the holder, protects the film emulsion from the heat of the welded section.

Additional time is saved because, if defects are found, it is necessary to chip away only a partially-completed weld, rather than a finished weld.

As an example of the time saved by the hot radiography process, welding time on comparable sections of pipe at a large eastern power plant was reduced from nine days to less than three days when work was inspected by the new process. The technique can also be used for radiography of other forms of hot metallic materials.

Chrysler West Coast Activities

Chrysler Corporation's first passenger car body assembly operations on the West Coast will be added to the present dual civilian-defense production work of the Dodge San Leandro, California, plant.

A large part of the 749,000 square foot addition recently completed at the plant is now being readied for production of Hamilton Standard propellers for the Navy and Air Force. The passenger car body operation will occupy the portion of the new addition not required for the defense assignment. It will help supply the passenger car assembly lines at the San Leandro plant and the Chrysler plant in Los Angeles and is scheduled to be in operation by early 1953.

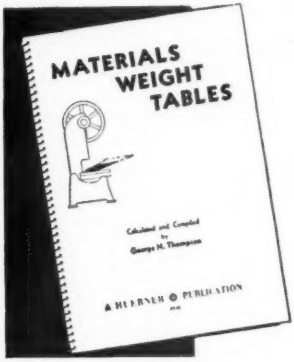
Meanwhile, substantial progress is being made in preparing the plant for its Navy bomber and Air Force transport propeller assignment.

For the body assembly operation, present plans call for the employment of approximately 1,100 persons on two shifts. Major departments will include body assembly, washing, bonderizing and paint departments, and a body trim line.

"KNOW-HOW" FOR SALE

COMPUTE stock weights QUICKLY

with Geo. A. Thompson's



Weights of sheet or bar stock or drill rod easily determined by one computation. "Faster Than a Slide Rule."

$2.50 per copy.

PLASTICS MOLDS

by Gordon B. Thayer

Tells how to

ESTIMATE

•

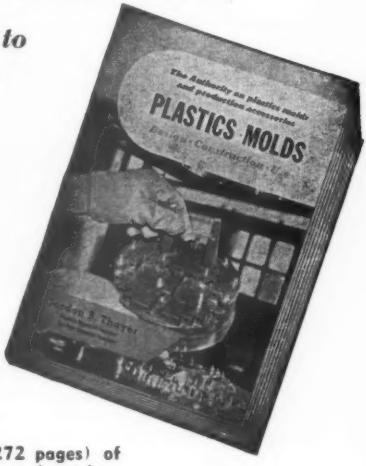
DESIGN

•

BUILD

•

USE PLASTICS MOLDS



22 chapters (272 pages) of plastics tooling and production "know-how".

More than 200 illustrations, tables and charts.

NOW ONLY $3.49 per copy.

ACCURACY and the GEOMETRY of PRECISION

BY E. WILLARD PENNINGTON

A historical and detailed, step-by-step presentation of the methods of generating, by scraping, master surface plates, straight edges and 30, 45, 60 and 90° angles.

35c per copy.

PRACTICAL QUALITY CONTROL

A collection of timely, instructive "how-to-do-it" articles, on the increasingly important subject of Quality Control.

$1.00 per copy.

HUEBNER PUBLICATIONS, Inc., 1973 Lee Road, Cleveland 18, Ohio JUNE-52

Gentlemen: Please send me at once: ☐ **Accuracy and the Geometry of Precision $ .35 each**

☐ **Plastics Molds - - - - $3.49 each**

☐ **Materials Weight Tables - - 2.50 each**

☐ **Practical Quality Control - - 1.00 each**

☐ **Purchase order enclosed**

☐ **Remittance enclosed, ship postpaid**

☐ **Send C.O.D. I will pay C.O.D. charges**

Name ..... **Title** .....

Company .....

Street .....

City ..... **Zone** ..... **State** .....

"... an expression of faith in the intrinsic soundness of our country..."

GEORGE C. BRAINARD
President, Addressograph-Multigraph Corporation

"The purchase of United States Savings Bonds is an expression of faith in the intrinsic soundness of our country, and indicates foresightedness with respect to one's own future needs. Since the inception of the Payroll Savings Plan by Addressograph-Multigraph Corporation in 1942, a large percentage of employees have continuously availed themselves of this safe and convenient method of providing for later benefits."

Every payday nearly seven million men and women give expression of their faith in America by putting $140,000,000 into U.S. Defense Bonds.

These seven million payroll savers are not only backing up our country's defense effort—they are providing for their own security . . . helping to combat inflationary pressures . . . and building a reservoir of future purchasing power. How big is the reservoir? On December 31, 1951, the *cash value* of series E Bonds outstanding was $34,727,000,000—*$4.8 billions more* than the cash value of Series E's outstanding in August, 1945.

If *your* employee participation is less than 60%, get in touch with the Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D.C. Your State Director will be glad to show you how to conduct a simple person-to-person canvass that puts a Payroll Savings Plan Application Blank in the hands of every employee.

The U.S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

HUEBNER PUBLICATIONS, INC.

1975 LEE ROAD

CLEVELAND 18, OHIO

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

Radioactivity Tests Tool Life

Radioactive tracers, a product of the atomic energy program, are now being used to lengthen the life of machine tools.

Present techniques in the application of this method were reported by E. J. Krabacher, research engineer; M. Eugene Merchant, assistant director of research, and Hans Ernst, director of research, all of the Cincinnati Milling Machine Company, before the 1952 semi-annual meeting of the American Society of Mechanical Engineers.

"The Tool life (volume of metal removed per resharpening of the tool) obtained in production machining operations has long been recognized as a prime factor controlling production costs," it was reported in a jointly-prepared paper.

"The search for increased tool life through the development of improved cutting fluids, work materials and machining conditions, requires controlled laboratory tool life testing.

"The application of radio-isotopes to this testing appears to hold considerable promise for greatly speeding up and simplifying the normally expensive and slow process of obtaining such machinability data, making many more such measurements possible in a given time, at less cost and with much less material.

"The new method also offers a further prospect of advancing the science and practice of machining, in that it provides a means of exploring in the laboratory the basic mechanisms by which cutting tools wear and fail, thus furnishing fundamental information which, again, can be applied to improve the life of cutting tools in practice."

The engineers said this new use of radioactive materials may well have a profound influence on the future capacity of the U. S. industry.

The testing method consists, in essence, of machining with a tool which has been rendered radioactive by neutron irradiation in a nuclear reactor, collecting the resulting chips and measuring their radioactivity due to the particles abraded from the tool during a few seconds of cutting. The amount of this radioactivity, as measured with a Geiger counter, is a direct measure of the amount of radioactive tool material worn away during the few seconds of cutting and is therefore a direct measure of the rate of tool wear, since it has been found that well over 90 percent of the radioactive tool material worn away during cutting remains attached to the chips.

"Since the rate of wear of a cutting tool is essentially constant throughout its life, this measurement of the 'instantaneous' rate of wear is a direct measure of relative tool life," the report stated. The research engineers have run tests with different types of work materials, different cutting fluids and under different cutting conditions. Some preliminary studies of fundamental mechanisms in the wear process have also been completed.

"While this method is still in the exploratory stage," they said, "the results already obtained in evaluating cutting fluids, work materials and cutting conditions indicate its ability to supply the much needed rapid tool life tests."

★ ★ ★ ★ ★ ★

The Elgin Dial Indicator Has Several New Features

The Elgin Dial Indicator, now being introduced, is a precision instrument incorporating new developments. It combines excellent sensitivity with the greatest possible ruggedness. The crystal is unbreakable, and the shank is enclosed to prevent gumming up from grease and abrasives. Among the features are an adjustable dial and a reversible action. The dial is calibrated in thousandths of an inch and has a range of plus or minus .015; .030 overall. Actual movement of the tip is magnified 100 times in the travel of the needle so that a variation as small as .0002" is easily apparent.

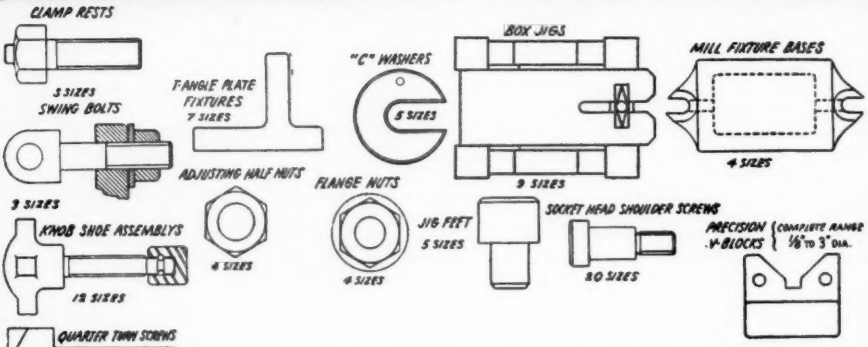
A unique back-clamp takes rods from ⅛" to 5/32" on one side, and up to ¼" on the other. This enables the Elgin to be directly fastened to most height and surface gages and magnetic indicator holders. The indicator may be locked in a milling machine chuck, or on the tool rest of a lathe. Two accessories adapt the indicator to measuring hole diameters from ¼" to 4", and obtaining indications within holes and slots up to 2" deep. Glore Industries, 2214 E. 75th Street, Chicago 49.

Circle Inform-A-Gram No. D1.

SAVE MAN-HOURS

OF YOUR DESIGNERS AND TOOLMAKERS!

USE NOBLE & STANTON STANDARD JIG AND FIXTURE PARTS



The rush is on . . . manpower shortages are here! Don't waste the valuable time of your designers and toolmakers in custom-building jig and fixture components.

Now is the time to use Noble & Stanton *Standard* Jig and Fixture Parts. Adopt them as standards in your plant. They're the best you can buy—are tough and durable—will never fail on the job—can be used over and over again.

Noble & Stanton Components are precision made from quality steels. NS parts are turned from solid stock—not welded or brazed. They're heat treated and hard chrome plated wherever practicable.

Write today for full information on the Noble & Stanton line of over 300 parts. They cost less than one-third the cost of toolroom manufacture. Tracing sheets are available for every part—saving you design time. Try a few of the items—or stock the whole line!

WRITE FOR CATALOG. Send today for this free 52-page book of drawings, specifications and prices.

NOBLE & STANTON, INC.

1002 BROADWAY • BEDFORD, OHIO

NS

INFORM-A-GRAM CARDS—USE THEM FOR PROMPT PRODUCT INFORMATION SERVICE

INFORM-A-GRAM CARDS—USE THEM FOR PROMPT PRODUCT INFORMATION SERVICE

INFORM-A-GRAM ADVERTISEMENTS IN JULY, 1952 Issue

DO NOT USE THIS CARD AFTER SEPT. 30, 1952

Name **Title**

Company **Address**

City **Zone** **State**

1	16	31	63	84	102	115	128	139B	155C	167A	175A	181A	182N
2	18	32	65	85	103	116	129A	139C	155D	167B	175B	181B	183A
3	19	33	67	87	105A	117	129B	139D	159A	169A	176A	182A	183B
5	20	34	69	89	105B	118	129C	141A	159B	169B	176B	182B	183C
6	21	35	71	90	106A	119	130	141B	159C	169C	177A	182C	183D
7	22	36	73	91	106B	120	131	141C	161A	169D	177B	182D	183E
8	23	38	74	93	107	121	133A	141D	161B	169E	178A	182E	184
9	24	39	75	94	108	122	133B	143	162	171A	178B	182F	185
10	25	40	76	96	109	123	133C	145A	163A	171B	178C	182G	186
11	26	41	78	97	110	124	133D	145B	163B	171C	179A	182H	
12	27	42	79	98	111	125A	133E	147	165A	171D	179B	182J	
13	28	44	80	99	112	125B	136	150	165B	174A	180A	182K	
14	29	59	81	100	113	126	137	155A	165C	174B	180B	182L	
15	30	61	83	101	114	127	139A	155B	166	174C	180C	182M	

[ ] Above is new address [ ] I would like to receive TOOLING and PRODUCTION regularly.

INFORM-A-GRAM ADVERTISEMENTS IN JULY, 1952 Issue

DO NOT USE THIS CARD AFTER SEPT. 30, 1952

Name **Title**

Company **Address**

City **Zone** **State**

1	16	31	63	84	102	115	128	139B	155C	167A	175A	181A	182N
2	18	32	65	85	103	116	129A	139C	155D	167B	175B	181B	183A
3	19	33	67	87	105A	117	129B	139D	159A	169A	176A	182A	183B
5	20	34	69	89	105B	118	129C	141A	159B	169B	176B	182B	183C
6	21	35	71	90	106A	119	130	141B	159C	169C	177A	182C	183D
7	22	36	73	91	106B	120	131	141C	161A	169D	177B	182D	183E
8	23	38	74	93	107	121	133A	141D	161B	169E	178A	182E	184
9	24	39	75	94	108	122	133B	143	162	171A	178B	182F	185
10	25	40	76	96	109	123	133C	145A	163A	171B	178C	182G	186
11	26	41	78	97	110	124	133D	145B	163B	171C	179A	182H	
12	27	42	79	98	111	125A	133E	147	165A	171D	179B	182J	
13	28	44	80	99	112	125B	136	150	165B	174A	180A	182K	
14	29	59	81	100	113	126	137	155A	165C	174B	180B	182L	
15	30	61	83	101	114	127	139A	155B	166	174C	180C	182M	

[ ] Above is new address [ ] I would like to receive TOOLING and PRODUCTION regularly.

INFORM-A-GRAM EDITORIAL ITEMS IN JULY, 1952 Issue

DO NOT USE THIS CARD AFTER SEPT. 30, 1952

Name **Title**

Company **Address**

City **Zone** **State**

A1	A11	A21	B5	B15	B25	B35	B45	B55	B65	D1	E5	E15
A2	A12	A22	B6	B16	B26	B36	B46	B56	B66	D2	E6	E16
A3	A13	A23	B7	B17	B27	B37	B47	B57	C1	D3	E7	E17
A4	A14	A24	B8	B18	B28	B38	B48	B58	C2	D4	E8	E18
A5	A15	A25	B9	B19	B29	B39	B49	B59	C3	D5	E9	E19
A6	A16	A26	B10	B20	B30	B40	B50	B60	C4	D6	E10	E20
A7	A17	B1	B11	B21	B31	B41	B51	B61	C5	E1	E11	E21
A8	A18	B2	B12	B22	B32	B42	B52	B62	C6	E2	E12	E22
A9	A19	B3	B13	B23	B33	B43	B53	B63	C7	E3	E13	E23
A10	A20	B4	B14	B24	B34	B44	B54	B64	C8	E4	E14	E24

[ ] Above is new address [ ] I would like to receive TOOLING and PRODUCTION regularly.

FIRST CLASS
PERMIT No. 7879
Sec. 34.9 P.L.&R.
CLEVELAND, O.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

TOOLING AND PRODUCTION
1975 LEE ROAD
CLEVELAND 18, OHIO

FIRST CLASS
PERMIT No. 7879
Sec. 34.9 P.L.&R.
CLEVELAND, O.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

TOOLING AND PRODUCTION
1975 LEE ROAD
CLEVELAND 18, OHIO

FIRST CLASS
PERMIT No. 7879
Sec. 34.9 P.L.&R.
CLEVELAND, O.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

TOOLING AND PRODUCTION
1975 LEE ROAD
CLEVELAND 18, OHIO

ADVERTISERS INDEX

Tooling & Production—Advertisers Index—Issue of July, 1952

A-1 Abrasive Laboratories 133C
Abrasive Machine Tool Co. 93
Ace Drill Bushing Co., Inc. 159B
Acme Broach Corporation 83
Acme Industrial Company 106A
Acro Metal Stamping Co. 155B & 155D
Agri-Detroit Company 178C
Alina Corporation 141A
Allegheny Ludlum Steel Corp. 2
Allied Products Corporation, Richard Brothers Division 23
American Drill Bushing Co. 81
American Measuring Instruments Corp. ..... 139C & 182C
American Pullmax Co., Inc. 139D
Atlas Press Company, Clausing Division 74

Balas Collet Mfg. Co. 186
Baldor Electric Company 155C
Barker Engineering Co. 161A
Barnes Company, Inc., W. O. 131
Barth Stamping & Machine Works, Inc. 87
Baumbach Mfg. Co., E. A. 63
Bausch & Lomb Optical Co. 33 & 125B
Bellows Company, The 3
Black Drill Company, Inc. 122
Boyar-Schultz Corporation 97
Brown & Sharpe Mfg. Co. 39

Challenge Machinery Co., The 126
Champion Tool Co. 133E
Chicago Wheel & Mfg. Co. 125A
Cincinnati Milling Machine Co., The 59
Cincinnati Shaper Co., The 6
Clearing Machine Corp. 85
Cleveland Grinding Machine Co., The 102
Cleveland Twist Drill Co., The 73
Cleveland Universal Jig Co. 182E
Colonial Bushings, Inc. 169E
Columbia Tool Steel Co. 183D
Commander Mfg. Co. 35
Conrad & Moser 182D
Cosa Corporation 80

Daniy Machine Specialties, Inc. 69
Darwin & Milner, Inc. 84
Davis Tool & Engrg. Co. 182B
Dayton Rogers Mfg. Co. 175B
Detroit Die Set Corp. 13
Detroit Power Screwdriver Co. 10
Detroit Stamping Company 109 & 174C
DeVlieg Microbore Co. 31
DeWitt Equipment Co. 169D
Dickerman Mfg. Co., H. E. 15
Die Supply Co., The 78
Die Techniques 159C
DoALL Company, The 94
Dreis & Krump Mfg. Co. 169C
Dremel Mfg. Co. 21
Drexel-Beiz Company 182A
Dumore Company, The 185
Dykem Company, The 177B

Ekier Engrg. Co. Inc. 133B
Elgin National Watch Co. 101
Elco Mfg. Company 163A
Ex-Cell-O Corporation 7

Federal Tool Corporation 159A
Fonda Gage Company 9

Gage Company 165B
General Die & Stamping Co. 145A
General Die & Tool Co. 182F
Globe Industries 180B
Globe Trading Company 163B
Gorham Tool Company 117
Govro-Nelson Company 99
Graymills Corporation 165C
Grobet File Co. of America, Inc. 133D
Guthery Machine Tool Corp. 71

H & P Die Stamping Co. 182G
Handy Products Co. 143
Hamilton Tool Co., The ..... 11 & 34
Hammond Machinery Builders 5
Hardinge Brothers, Inc. 22
Haskins Company, E. G. 24
Harig Mfg. Corp. 38
Heimann Mfg. Co. 141D
Hoggson & Pettis Mfg. Co. 171C
Horberg Gage Co., The 123
Hovis Screwlock Company 30
Huebner Publications Inc. 147
Humm Safety Equipment Co. 183A
Hutchinson Company, Wm. T. 129B

Industrial Machine Co., The 182H

Jergens Tool Specialty Co. 42
Jiffy Mfg. Company 90
Johnson Gas Appiance Co. 128
Jones & Lamson Machine Co. 65

Kase Machine Company 113
Kiffer Tool & Die Co. 182J

Lectrotech Co., The 41
Lee Company, K. O. 107
Lempco Products Inc. 98
Levin & Son, Inc. Louis 96
Littell Machine Co., F. J. 103
Linderme Engrg. & Sales 179A
Logan Engineering Co. 25

Mall Tool Company 116
Master Appliance Mfg. Co. 171D
Mead Specialties Co. 100
Meyers Co., Inc. W. F. 120
Michigan Chrome & Chemical Co. 181A
Micrometrical Mfg. Co. 110
Montgomery & Co., Inc. 174A
Moore Special Tool Co., Inc. 8 & 179B
Morey Machinery Co., Inc. 105B
Morton Machine Works 137

National Tool Co. 118
Neise, Karl A. 141B
Noble & Stanton, Inc. ..... 139 & 182K
Nobur Manufacturing Co. 127
Northwestern ..... 133A & 139B
Norton Company 36

Oliver Instrument Co. 162
O'Neil-Irwin Mfg. Co. 61
Onsrud Machine Works, Inc. 112

Palley Supply Co. 130
Perfex Gage & Tool Co. 75
Perkins Machine Co. 14
Phoenix Machine Co., The 182L
Pratt & Whitney, Div. Niles-Bement-Pond Co. 76
Preis Engraving Machine Co. H. P. 183B
Putnam Tool Co. 1

Raymac Manufacturing Co., Inc. 183C
Reid Tool Supply Co. 181B
Rice Pump & Machine Co. 176A
Richards Company, J. A. 129A
Ring Punch & Die Co. 166
Robbins Company, Omer, E. 136
Roll-Feeds Corp. 175A

Scherr Co., Inc., George ..... 129C & 169B
Schmitt Company, R. L. 165A
Schraner & Co., A. F. 182M
Schupack Supply Co. 184
Scully-Jones and Co. 27
Service Machine Co. 180A
Severance Tool Industries, Inc. 174B
Sheldon Machine Co. 121
Shore Instrument & Mfg. Co. Inc., The 178B
Sid Tool Company, Inc. 20
Skyline Tool & Gage Co. 182N
South Bend Lathe 12
Standard Electrical Tool Co., The 105A
Standard Pressed Steel Co. 16
Strand Co., Edward D. 139A
Strand Mfg. Company 180C
Superior Steel Products Corp. 89
Sutton Tool Company 29
Swartz Tool Products Co., Inc. 167B

Tannewitz Works, Inc. 114
Tietzmann Tool Corp. 178A
Tomco Products Co. 171B
Tracer Control Company 91
Tubular Micrometer Co. 18
Turchan Follower Machine Co. 67
Twentieth Century Mfg. Co. ..... 171A & 176B

Universal Engineering Co. 145B

Verson Allsteel Press Co. 79
Victor Machinery Exchange, Inc. 161B
Vocar Mfg. & Sales 40
Vulcan Tool Co. 28

WLS Stamping Company 115
Wales-Strippit Corp. 26
Walis Sales Corp. 183E
Watts Brothers Tool Works 169A
Weldon Tool Co., The 111
Wesson Co., Affiliated with Wesson Metal Corp. 44
West Tool & Die Corp., R. C. 177A
Wheelock, Lovejoy & Co., Inc. 155A
Whistler & Sons, Inc. S. B. 19
Whitney Metal Tool Co. 167A
Wirth & Son, Inc., Carl 106B
Wittek Mfg. Co. 32
Woodson Tool Co. 108

Yost Mfg. Company 141C

Zagar Tool, Inc. 119

INFORM-A-GRAM KEY NUMBERS

Die Set Gives Long Accurate Performance

At the Washburn Company, Rockford, Illinois, one of the world's largest manufacturers of kitchenware, Baumbach die sets are used almost exclusively in producing a fine line of kitchen utensils. The press set-ups illustrated show how flour sifter handles are produced from 3" x .035" carbon steel coil stock. The pieces are run on an inclinable press equipped with variable speed drive set up for automatic operation. A 4-stage progressive die is employed which perforates, forms, and cuts off the piece parts at a speed of 2580 per hour.

The Baumbach precision-built die set, used on this job for over 9 years, has produced an average of 175,000 pieces per year, and a total of more than 1,675,000 pieces. During this entire period, reports show that no maintenance to the die set has been required. The original pins remain tight and in good condition. Credit for this type of service is, of course, not only due to the Baumbach design and precision methods of fabricating die sets, but also to careful setup and operating procedures maintained at Washburn under the direction of Clarence Long, Plant Superintendent. For example, the presses are checked and corrected for slide wear whenever a leader pin shows evidence of binding. A good deal of care is likewise taken to assure proper lubrication. Similarly, die sharpening procedures are followed on a regular schedule, which, experience has shown, helps maintain peak operating efficiences. Thus, good dies mounted on a high quality die set in a properly maintained press pays off in lower costs.

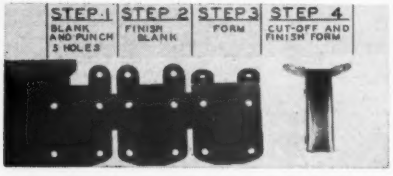


Fig. 1. Washburn work piece, showing the operation performed at each stage in producing a flour sifter handle.

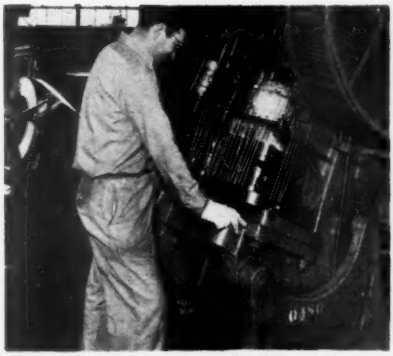


Fig. 2. Press setup at the Washburn Company, Rockford, Illinois, used to produce carbon steel flour sifter handles from 3" x .035" coil stock. Production is maintained at a rate of 2580 pieces per hour. Die set, Baumbach Style B., has been used on this setup for over 9 years.

Fig. 3. Closeup view of die set showing Baumbach's exclusive method of mounting leader pins. Also, note the advantages of the welded hold-down insert design which provides a safe, recessed clamping area that never projects above the die face. Leader pins shown in this set have run without maintenance for over 9 years, and have produced over 1,675,000 pieces.

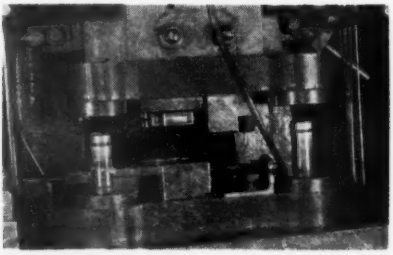


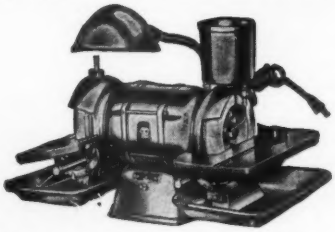
Fig. 4. Front view of press set up with guards removed. U. S. Tool Slide Feed is employed, and a Littel Automatic Centering Reel. After piece is side formed, it is then ejected from the press by compressed air.

OCTAGONS BILLETS AND FORGINGS FOR PRODUCTION
100 YEARS OF SERVICE ROUNDS, SQUARES, FLATS, HEXAGONS
TOOL & DIE MEN SPECIFY
HY-TEN
"M" TEMPER ALLOY STEEL
for maximum machinability and minimum heat-treat distortion. It has great toughness at high degrees of hardness and long-wearing properties for lowest unit cost. For complete information on HY-TEN alloy steels, write for FREE DATA BOOK.
1001 ROOM AND MAINTENANCE REQUIREMENTS
WHEELOCK, LOVEJOY & COMPANY, INC.
Warehouse Service
CAMBRIDGE HILLSIDE, N.J. · CLEVELAND · DETROIT · CINCINNATI · CHICAGO · BUFFALO
HY-TEN and AISI
135 Sidney St., Cambridge 39, Mass.

STOP WEAR on Die Sets

. . . with ACRO Pin Oilers
Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminates bushing wear, leader pin scoring, and maintains die accuracy.
Write for FREE Bulletin
describing Acro products
Ask for Bulletin TD-30.
ACRO Metal Stamping Co.
330 E. Reservoir Ave., Milwaukee 12, Wis.

Baldor
Carbide Tool Grinder



For precision work
Short wheel and bearing centers, heavy shaft, large ball-bearings, dynamically balanced armature and weight-balanced wheels provide rigidity and smoothness necessary for precision work. ½ hp, 3400 RPM reversible motor. $142.60 complete.
Mail this ad for Bulletin No. 341-B
BALDOR ELECTRIC CO.
4369 Duncan Ave., St. Louis 10, Mo.

WHICH ARE YOU USING?
. . the grunt-pull, hammer-wrecking bar, costly method of die separation . . . using two or three men? Results are pinched fingers, scored pins, battered dies and waste of time and money.

OR
. . . the modern efficient method that is now in actual use by hundreds of leading plants and die shops* —The Acro Die Set Puller method.
Write for free information.
Ask for bulletin TD 1250.
*List of users on request.

ACRO METAL STAMPING CO.
330 E. RESERVOIR AVE.
MILWAUKEE 12, WIS.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Use free Inform-A-Gram Card for fast service

QUICK-PIC

CUTTING FLUID

A beautifully illustrated booklet "Cimcool Defeats Heat" tells the story of research into cutting fluids and the eventual development of "greater efficiency".

Circle No. E5.

PUNCHING

Wales type "HS" hole punching units will punch ¾" thick mild steel. Bulletin HS details construction features. New hydraulic principle employed.

Circle No. E6.

LATHE CONVERTERS

Master Lathe Converters are illustrated and described in a catalog showing many applications of these versatile tools where outlay and production time have been cut.

Circle No. E1.

CUT THREAD TAPS

P & W high speed steel cut thread taps will give good performance at low cost. Catalog lists complete range of standard and special lines.

Circle No. E2.

PNEUMATIC FEEDS

Bellows drill press feeds will accurately control thrust and feed rate, and enable inexperienced operators to turn out accurate work.

Circle No. E9.

DUST CONTROL

"The Control of Industrial Dust" is the title of a new Pangborn brochure, which tells the story of the "why and how" of dust control applied to industrial needs.

Circle No. 10.

DRILLING AND TAPPING MACHINES

Kaukana horizontal and vertical drilling and tapping machinery is pictured, described, and specified in a new booklet.

Circle No. E3.

CHUCKING

Do away with pot fixtures, inaccurate time consuming setups. Booklet describes interesting advantages gained with Speedgrip second operation internal chucking technique.

Circle No. E4.

HOB FINISHES

Accuracy of Michigan unground hobs developed through a new process will permit applications in many cases cutting costs. Table of comparative tolerances given as guide.

Circle No. E11.

BROACHING

Versatility of the Acme U-31 broaching machine allows any type of ordinary operation to be done. Multiple slides eliminate change-over.

Circle No. E12.

AIR VALVES

Catalog 303 details the complete line of Standard Rivett air valves, giving drawings, specifications, and description for each model.

Circle No. E7.

FINISHING

Blue Magic barrel finishing compounds are described in attractive booklet. Case histories, with description, advantages, precautions, and media are given for each compound.

Circle No. E8.

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

CATALOGS

Use free Inform-A-Gram Card for fast service

SAWS

Band and Profile saw blades of various types are described in latest Milford manual. Complete listings are given, with cutting recommendations.

Circle No. E17.

EASY HANDLING

May-Fran hinged-steel belting handles heavy, hot, or highly abrasive materials economically and without trouble. Can be ordered to almost any specifications.

Circle No. E18.

PUMP CASTINGS

"Meehanite" metal applied to pump castings is described in new folder. Metal resists erosion, corrosion, impact and pressure better.

Circle No. E13.

CLAMPS

Toggle action clamps, pliers, and wrenches are described in catalog R-10 from Lapeer. These "Knu-Vise" products are calculated to cover any industrial work-holding need.

Circle No. E14.

AIR SHEARS

Clean design indicates good engineering of the Niagara air powered squaring shears. Catalog gives specifications and capacity data for all models. Alliy knives available.

Circle No. E22.

DIAMOND DRESSERS

A complete range of diamond dressers is listed in the latest catalog from Diamond Products Inc. Hints are offered.

Circle No. E21.

TOOL STEELS

Different types of tool steel for the fastener industry are given full description in catalog from Universal Cyclops Steel.

Circle No. E15.

VERSATILE AUTOMATIC

Vertical multiple-spindle automatic machine can be adapted to bar and chucking work. Standard equipment includes cross slides and tool carrying spindles.

Circle No. E16.

TUMBLING MACHINERY

Efficient tumbling is dependent on efficient design. New Globe folder highlights the engineered design points, such as six-way action, that gives better results in less time.

Circle No. E23.

CASTERS & TRUCKS

Big newly released catalog describes "Rapistan" casters and trucks. Made in steel drop forgings for long life.

Circle No. E24.

QUALITY CARBIDES

Newcomer "controlled quality carbide tools and blanks are made under exacting inspection requirements at each stage of manufacture. Product stands heavier feeds.

Circle No. E19.

BORING TOOLS

Etco boring tools are catalogued in new folder. Company gives quick attention to "specials". Catalog also features wheel dresser.

Circle No. E20.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Powder Metallurgy in Lionel Trains

The Lionel Corporation, largest manufacturer of model railroad equipment, has put powder metallurgy to work on numerous production jobs in its plant at Irvington, New Jersey. Joseph Bonanno, Lionel's Chief Engineer, has been aware of the advantages offered by powder metallurgy for many years and has instituted its use wherever feasible.

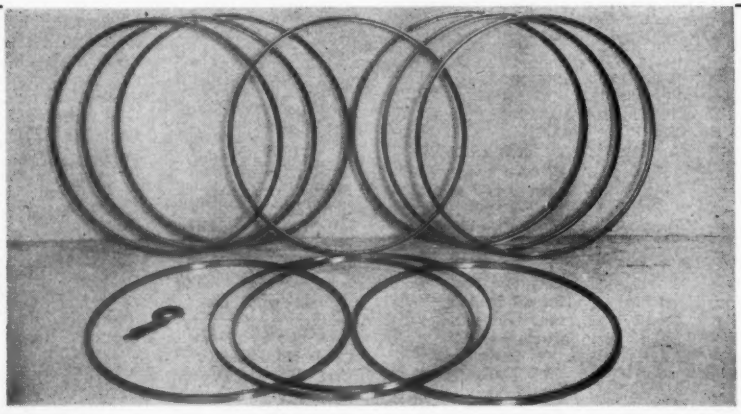
Lionel has found that the use of powder metals often results in an improved product at lower cost and avoids the aging sometimes characteristic of die-cast metals. Both car and locomotive wheels, for example, were formerly die cast of a zinc-base metal but are now pressed from iron powder on a Stokes press.

Powder metal is particularly advantageous to this application because it made possible a recent Lionel development, "Magnettraction," which permits trains to travel at higher speed and to make sharp turns. Magnets are installed in close proximity to the iron wheels of the locomotives to make them cling to the rails; this improves locomotive traction and makes derailments less likely. The wheels are treated to give a black non-rusting surface.

When these wheels were die cast, flash had to be trimmed after casting and an assembly operation was necessary for the installation of a steel tire. Powder metal, of course, is pressed into shape by a single stroke of the press and sintered to a hardness sufficient to withstand model railroad service. Spokes, counterweights, and other built-up sections are formed without difficulty, and holes for axles are absolutely true.

Lionel finds that these and other model railroad parts are made more cheaply with powder metals, in part because there is no waste of metal. A current advantage of powder metals is that they are more readily available than other materials and the price level has held firm.

Among the many Stokes presses in the Lionel plant is one recently added powder metal press used for both model railroad and defense order production. Lionel manufactured electrical and navigation equipment throughout the last war and is currently using part of its facilities to turn out war material.



From the shops of the Kaydon Engineering Corporation of Muskegon, Michigan, come these examples of precision ball bearings of most unusual proportions. Weighing only two pounds each, their cross section width is dwarfed by their 17.625" outside diameter and 16.875" inside diameter. The precision tolerances to which these bearings are finished are, in proportion, far superior to the finest watch parts.

Your Production Load with FEDERAL TAPERLOCK PLASTIC GAGE HANDLES

LIGHTWEIGHT and DURABLE—FEDERAL Taperlock Plastic Gage Handles are *one-third lighter than aluminum!* Permits extremely sensitive "touch" necessary in close tolerance work. Lightness helps reduce fatigue from long, continuous use. Ideal for use by women inspectors.

IDEAL FOR GLASS GAGES—The light weight of FEDERAL Gages reduces danger of chipping and breaking if dropped.

IDENTIFICATION MARKING—Quickly done with the same stamps and tools used for marking handles of other materials.

INSULATION—Plastic possesses insulating properties that protect gages from bodily heat that might affect accuracy.

STANDARD SIZES—FOUR COLORS—Available in four standard colors: for quick identification—red, yellow, green and black—in seven (7) sizes: 00-0-1-2-3-4-5.

Made of durable plastic, FEDERAL Taperlock Gage Handles are tough and long-lasting. They do not mar or chip with severe use. Increase the efficiency of your production workers with FEDERAL Plastic Taperlock Gage Handles.

FEDERAL TOOL CORP
3606 W. Pratt Blvd. • Chicago 45, Illinois

Specialists IN ONE THING, the World's BEST Bushings

ACE DRILL BUSHING CO., INC
5407 Fountain Ave.
Los Angeles 29

Here, at ACE all our energies are concentrated on one product—the world's finest drill bushing. ACE Drill Bushings are engineered for maximum accuracy—guaranteed by triple inspection and light wave control. No wonder engineers everywhere specify ACE for exacting, ultra-precision work. Order your FREE copy of our new catalog today.

Ask for Catalog 1101-9

This

DIE BOOK

CONTAINS CONDENSED PRACTICAL AIDS FOR EXPERIENCED

DIE MAKERS

Answers to Over 1000 Practical Die Problems With Use of Direct Reading Tables and Formulas

ALL IN ONE COMPACT HANDBOOK . . . direct answers to die problems. Saves time. Eliminates mathematical calculations. Avoids costly errors. Contains invaluable formulas and tables for quick reference.

Formulas and Direct Reading Die Tables on the following types of dies: Bending and Forming Dies, Blanking Dies, Drawing Dies, Square and Rectangular, Drawn Shells, Miscellaneous Tables and Charts.

Write for Bulletin 88—Money Back Guarantee—Ten Days' FREE Examination.

DIE TECHNIQUES
Publishers: 505 W. Lake St., Chicago 44, Ill.
Please send on approval Condensed Practical Aids for Die Engineers, Designers and Die Makers.

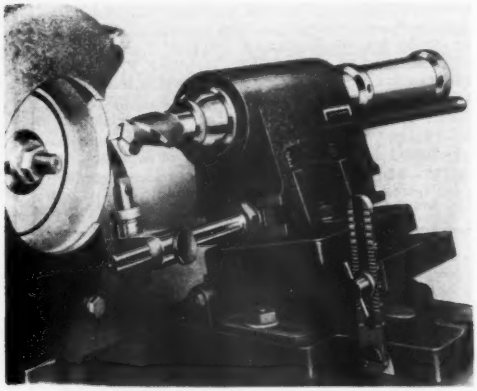
☐ Enclosed $3.50 for one book
☐ Enclosed ($3.00 each for 6 or more)

Name .....
Firm .....
Address .....

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Sub-Base for Grinding Clearance Angles

A Sub-Base For Use In Grinding Clearance Angles which can be attached to the well-known Weldon End Mill Sharpening Fixture has been developed by the Weldon Tool Company, of Cleveland, Ohio. One of the most attractive features of this device is its extreme ease and simplicity of operation. As the hinged sub-base is raised or lowered, the peripheral clearance of the end milling being sharpened is changed accordingly. The sub-base is positioned by an arm at the side with graduated notches to indicate the degrees of clearance. This part of the fixture guides the operation, and gives absolute and positive control simply and quickly at all stages. For example, if the required clearance angle to be produced on the end mill is 10 degrees, the arm is also locked at 10 degrees. The necessity for guess work in securing the desired clearance angle is thus completely eliminated, and at the same time the attachment provides so easy yet so accurate a method of securing the desired clearance angles that it becomes a "must" for any progressive shop. The attachment gives positive, quick, and simple operation. Because its use greatly reduces time spent in sharpening end mills, and because it makes sharpening so much more positive and easy, tool life is much increased, work finishes improved, and production costs correspondingly lowered. Literature describing this new product is available from the manufacturer.

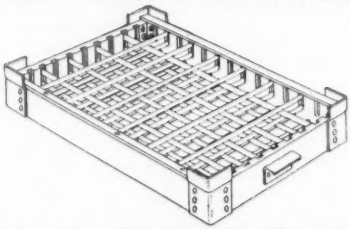


Circle Inform-A-Gram No. D2.

New Materials Handling System

Said to be the only materials handling system of its kind in the country, and employing hardwood construction, the new Wesling technique offers simplicity, flexibility, and economy of operation.

The system is based on a master hardwood unit with inside working dimensions of 24" long by 13½" wide by 2⅜" deep. The bottom is made up of ½" hardwood dowels running across the width on 1½" centers. This affords sufficient support for metal parts being loaded and plenty of opening for free draining of liquids or passage of air. Slots in the ends and sides of the unit permit thousands of space combinations to be set up by using crosswise and lengthwise hardwood dowel dividers. The dividers separate the metal parts during handling and reduce damage and loss from chipping and denting. Build-up sections may be added to the master unit for parts that are too tall to handle. These are of the same size and construction as the master unit, except that they have no dowel bottom. However, cross doweling for space combinations may be set up to match the master unit. A peg tray is employed for such small parts as gears and bushings. It has 880 3/16" holes spaced on 9/16" centers, and is made of tempered board 3/16" thick.



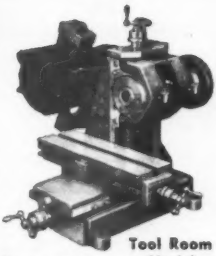
The peg tray fits snugly into the master unit. Between the peg and dowel setups, tens of thousands of space combinations are possible. Almost any part within the dimensional limitations of the box may be easily handled. Steel corner construction adds rigidity, protects the corners, and is a safety guide when stacking units. Bulletin A-27 from Albert Wesling & Sons Inc., 2912 W. Lake Street, Chicago 12, Illinois.

Circle Inform-A-Gram No. D3.

The BARKER "MILLER"

Will Efficiently Handle "101 TRICKY" Second Operation Jobs on SMALL PARTS ordinarily requiring larger, expensive milling machines

Production Model



Tool Room Model
3 Micrometer feed screws. Ideal for instrument mfgs., and tool and die shops.

The Barker exclusive 3-way travel feature affords versatility of operation.
Rapid production rate with inexperienced help. Easy set-up for small run jobs.
Compare Barkers "plus" features with other small "millers," then decide.

TYPICAL END MILL OPERATION UTILIZING HEAD MOVEMENT ONLY

WRITE FOR LITERATURE AND COMPLETE INFORMATION

BARKER ENGINEERING COMPANY 500 GREEN ROAD CLEVELAND 21, OHIO

Victor's Specials Deserve Your Attention!

Model 186 E/7 **WODEN** Mechanics' Bench Vise

- *HEAVY DUTY • SWIVEL BASE*
- *QUICK ACTION INSTANT GRIP*

Complete with all the features of the regular mechanics' vise PLUS quick action grip! Accurately machined and quality finished throughout. Special steel jaw plates correctly hardened . . . renewable and interchangeable. Secured by bolts from back of slide and body heads for easy maintenance and interchanging. Swivel Base locks easily by means of two hand levers.

We are the sole U. S. Distributors for WODEN Quick-Acting Vises.

Also MODEL 190/7A STEEL BENCH VISE, GUARANTEED UNBREAKABLE! Same features as 186 E/7. Steel vise guaranteed; cast iron base not guaranteed.

MODEL No.	JAW WIDTH	JAW DEPTH	JAW OPENS	WEIGHT	NET PRICE
186 E/7	4¼"	3⅜"	6¼"	75 lbs.	$32.50
190/7A	4½"	3"	5¾"	50 lbs.	35.00

VICTOR MACHINERY EXCHANGE, INC.
DEALERS IN TOOL ROOM EQUIPMENT
251 P Centre St. • New York 13, N. Y. • Phone: CAnal 6-5575

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

FAMED for PRECISION

WEST POINTERS' DRILL FORMATIONS ARE MOST ACCURATE

Precision is the keyword at West Point. The Corps of Cadets is famed for the precision with which its squads, companies and battalions parade in the most complicated of drill formations and maneuvers.

OLIVER DIE MAKING MACHINES INCREASE TOOLROOM EFFICIENCY

The Oliver Method for machine sawing, filing and lapping operations has increased toolroom efficiency in thousands of plants throughout the world. They have effected savings up to 60%. They are noted for their long lasting qualities. In fact, many Oliver Die Makers have been in continuous use for more than 25 years. Speedy and accurate, Oliver Die Makers are simple to operate — skilled labor is not required. For almost 40 years Oliver has been helping increase toolroom efficiency while saving time and headaches.

OLIVER DIE MAKERS Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write Today For Complete Technical Data on OLIVER DIE MAKERS

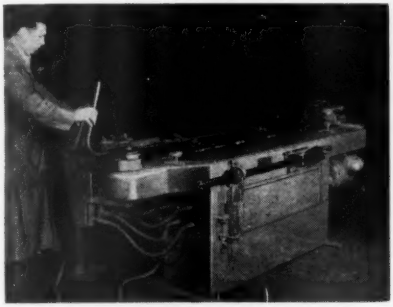
OLIVER INSTRUMENT CO.

1036 E. MAUMEE · ADRIAN, MICHIGAN

New Tube Bender Features Versatile Operating Circuit

Visitors at the A.S.T.E. Exposition were the first to see the new, compact, more versatile production bending machine, the Pines Aircraft Size ¾" tube bender, now built by the Pines Engineering Company.

Of special interest was the size of the machine, occupying 30% less floor space than former units, and the new operating circuit that permits individual control of all functions at any time during the cycle.



Front view of New Pines Size ¾" Aircraft Bender featuring shorter base and a more versatile operating circuit. New interchangeable angle-of-bend turrets and location-of-bend stop assemblies save set-up time, permit duplicating accuracy on repeat runs.

Details of the new circuit consists of an additional push button control panel that enables the operator to stop, start, or reverse the cycle at any given point. Mandrel, clamp die, and pressure die operate automatically or independently. Tooling results can thus be checked easily at any given point. A workpiece can be formed, checked, and replaced in the bender for an additional two or three degrees of bend quickly and easily.

This new circuit control not only saves time in bending individual pieces on short or test runs, but also increases efficiency on production run setups.

Another important feature of the new bender is a new pick-off angle-of-bend turret, and a removable location-of-bend stop assembly, for repeat setups.

"MITI MITE" No. 100

The New, Amazing Magnetic Base Holder
for mounting Test Indicators to flat or curved surfaces
INSTANTLY!

Price **$7.50** Handsomely wooden boxed.

ELIMINATES CUMBERSOME HAPHAZARD CLAMPING

Easily mounts to shaft. Magnetic pull app. 50 lbs.

Base size, 1" x 1⅛".

Ball and socket swivel construction permits precision adjustment.

Posts and adaptors included for taking most small indicators.

Shows mounting of MITI-MITE on mill arbor to line up milling vise.

See our booth at A.S.T.E. Show, Chicago, in March

OTHER "MITI-MITE" UNITS

No. 120—Combination Test Indicator Magnetic Base Holder and 4X double lens Magnifier....**$12.00**

No. 150—Duplex Magnetic Base Holder for all dial indicators up to 3" dia.....**$15.50**

No. 200—Magnetic Base Handi-Lite, complete with 25 and 40 watt bulbs.....**$8.50**

No. 300—Combination of No. 100 & 200 **$13.50**

Send for Bulletin 604

ENCO MANUFACTURING COMPANY, Dept. 772
4524 W. Fullerton Ave., CHICAGO 39, ILL.

Order from your mill supply dealer or send order with name of your mill supply dealer.

FOR SALE

We can make immediate delivery from our warehouse of HOT WORK DIE STEEL — TOOL STEEL — SPECIAL STEELS. All standard recognized brand names — guaranteed quality!!

HOT WORK DIE ROUNDS

Size	Trade Name	Weight
7"	Pressuredie ⅜3	77100 ⅜
5¼"	Hot Form	48900 ⅜
5¼"	"LPD"	3592 ⅜
5¼"	⅜883 Carpenter	2875 ⅜
5 3/16"	"HWD"	33600 ⅜
4½"	Pressuredie ⅜2	4658 ⅜
4¼"	"Shell Die"	16250 ⅜
4¼"	"HWD"	9000 ⅜
4¼"	"Shell Die"	2400 ⅜
4"	Pressuredie ⅜2	9000 ⅜
4"	"LPD"	5800 ⅜
4"	"Chro-Mow"	3100 ⅜
4"	"H.W.D."	445 ⅜
4"	Pressuredie ⅜2	455 ⅜
3⅝"	"Shell Die"	4296 ⅜
3½"	"Chro-Mow"	28577 ⅜
3½"	"TCM"	33200 ⅜
3½"	"LPD"	20000 ⅜
3½"	"DC-33" Kloster	18700 ⅜
3½"	"Hot Form"	13100 ⅜
3½"	Pressuredie ⅜2	11700 ⅜
3½"	"Shell Die"	8728 ⅜
3½"	"Air Kool"	1293 ⅜
3½"	"Fire Die"	1190 ⅜
2⅞"	"TCM"	1260 ⅜

HOT WORK DIE SQUARE

8½" x 8½" x 84"	Halcomb ⅜218	40000 ⅜

TOOL STEEL (WATER H.) ROUNDS

Size	Trade Name	Weight
5¾"	"CFS"	17700 ⅜
5½"	SAE 1095	2800 ⅜
5¼"	SAE 1095	1290 ⅜
4½"	SAE 1095	328 ⅜
4¼"	"CFS"	6093 ⅜
3¾"	SAE 1095	385 ⅜
2¼"	SAE 1095	270 ⅜
2 1/16	SAE 1095	5700 ⅜
2"	Vulcan Spec.	8735 ⅜
1 15/16"	SAE 1095	140 ⅜
1¾"	SAE 1095	2100 ⅜
1 11/16"	SAE 1095	20000 ⅜
.655"	SAE 1095-CD	28500 ⅜

TOOL STEEL (OIL H.) ROUNDS

6¼"	"Ketos"	12000 ⅜
4½"	CRU.DBL/Spec.	14890 ⅜
4"	"Vibro"	27300 ⅜
3"	"K.W." Carpenter	24000 ⅜
1⅝"	CRU.DBL/Spec.	2140 ⅜
⅞"	"SKF" 711	13400 ⅜
7/16"	"SKF" 711	1900 ⅜

OIL HARD SQ. & RECT.

1¾" x 2" x 120"	"SKF 711"	6200 ⅜
1¾" x 1¾" x 120"	"Atlas 93"	10300 ⅜

WATER HARD RECT.

1¾" x 1" x 120"	"Silver Star"	33000 ⅜
1½" x 1" x 120"	"Columbia"	1700 ⅜

SPECIAL!! **"Magic" Chisel Steel (Jessop)—9/16" RD.—C.D.—45,000⅜**

NOTE: We have large stocks of SAE 1095 (H.R.) Tool Shank Steel in Squares & Rectangles.

GLOBE TRADING COMPANY

1815 FRANKLIN ST. **All Phones WO. 1-8277** **DETROIT (7), MICHIGAN**

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

The New Winnen Commercial Incinerator saves more than its cost in refuse hauling charges within six to twelve months. It completely consumes up to 400 lbs. per hour of wet or dry refuse of all kinds. A smaller model consumes 100 lbs. per hour. Combustion is so complete that there is usually less than a bushel of ashes left after a week of normal operation.

The C-20 is Winnen's largest model. It is the only incinerator of its size that does not require brick work or masonry, and it therefore costs about half as much as the usual type, and is easily installed in less than a day's time. Practically all smoke and odors are eliminated through forced draft, a special ventilating system, and secondary combustion. A hot, intense flame is delivered by twin burners using natural, bottled, manufactured gas or oil fuel. Running cost are amazingly low. All models have a complete and heavy lining of refractory material.

The incinerator can be installed either in or outdoors, is equipped with the latest safety devices, and is safe and virtually foolproof. All models can easily be relocated in less than a day if the owner finds it necessary to move the unit, and all models are available for use without fuel.

Winnen incinerators are shipped complete. Instructions for assembly and installation are furnished, and any qualified maintenance man can have a Winnen ready to operate within a day or less. Write the Winnen Incinerator Co., Dept. 932 Broadway, Bedford, Ohio.

Circle Inform-A-Gram No. D4.

A Unique Advance In Height Gage Design is marked by the introduction of a gage with movable differential scale system for measuring and marking at any point up or down. The graduations on the right give the absolute measurement from the measuring surface (surface plate). The graduations on the left run downwards in series of 5 inches, (0 to 5"). If it is desired to begin measuring at a certain height, the scriber attached to the

Vernier scale is moved to this point in the conventional way. Then the main scale, which is movable in the upright beam by means of fine screw adjustment, may be moved to coincide at any convenient decimal with the Vernier Scale. Beginning with this new starting point additional height measurements may be taken. Similarly the left downward main scale may be lined up with the left Vernier, and downward measurements taken. It is therefore possible to measure from any given point up or down without having to figure differentials. This design prevents all computing errors. Brand Tool & Supply Co., 907 S. Victory Blvd., Burbank, Calif.

Circle Inform-A-Gram No. D5.

A New Stick-Type Wax Lubricant is now available from the DoAll Company, 254 North Laurel Avenue, Des Plaines, Illinois. The product is called "Tool-Saver", and is designed for the lubrication of cutting tools, threaded metal fastenings, and other metallic forming tools. In use, it considerably reduces the friction and accompanying heat occurring in machining operations. This makes possible better tool performance and at the same time prolongs tool life and preserves tool temper. It also helps prevent detrimental abrading, scoring, or burning of the tool or the work, and noticeably improves surface finish on the machined material. A pound of DoAll Tool-Saver is supplied in a handy pushout cardboard dispenser tube measuring 11" long by 2" in diameter and is applied directly to the tool or the surface of the material to be machined. The lubricant is pushed from one end of the tube until its other end is exposed.

Inform-A-Gram No. D6.

Cuts CENTER LAPPING Cost

Solid Carbide CENTER LAP

Outperforms Abrasive Laps

500 to 1

★ ★ ★

CARBIDE TOOLS RESHARPENED

★ ★ ★

New CATALOG on SOLID CARBIDE TOOLS free

12 Years Mfg. Experience

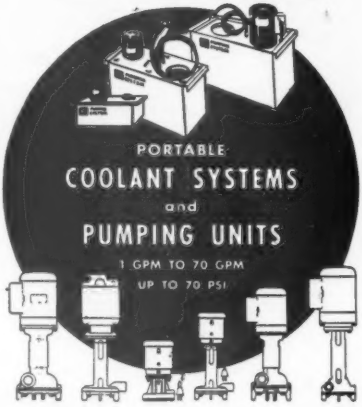
R.L. SCHMITT Co. 6536 ROOSEVELT ALLEN PARK, MICH.

Write for free copy

GAGE COMPANY
BATTLE CREEK, MICH.

GET MORE PRODUCTION FROM YOUR MACHINES WITH —

GRAY-MILLS



PROPER application of coolants means increased production and time and tool savings. You can have these advantages for every machine—small, large, and special—with Graymills Portable Coolant Systems.

They can be installed in a few minutes, are modern in design, and of heavy duty construction with built-in automatic pressure relief valve on gear pumps.

Sturdy high pressure gear models . . . smooth high volume centrifugal types in 1/25 to ½ HP ratings, 1 gal. to 70 g.p.m. with tank capacities from 5 to 38 gals. Also immersion type centrifugal pump and motor units.

WRITE FOR NEW CATALOG SHOWING SELECTION CHART . . . TELLS THE RIGHT PUMP OR COOLANT SYSTEM FOR THE JOB.

MOST INDUSTRIAL DISTRIBUTORS STOCK STANDARD UNITS.

GRAYMILLS CORPORATION
3713 LINCOLN AVENUE • CHICAGO 13

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

RING PUNCHES

HARD...

tough...

concentric

Precision-made of both Carbon Vanadium and high carbon, high chrome steels. Available in a wide range of stock sizes from 1/32" to 1" point diameters in increments of 1/64" for immediate delivery. Decimal sizes to order for delivery within 48 hrs.

Button Dies
Ring Type or Press Fit

Hole tapered to eliminate slug jamming. Sizes in stock to match punch sizes.

Write TODAY for your copy of handy data sheets covering specifications and prices; also name of distributor in your area.

Dealer Inquiries Invited

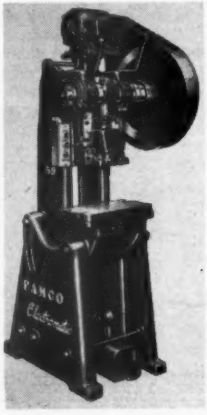
Ring Punch & Die Co.
108 Foote Ave., Jamestown, N. Y.

Electronic Clutch Featured On New Power Press

An electromatic power press which promises to be one of the most revolutionary developments in small press history has been announced by the Famco Machine Co. This press features a new instant-action, electrically-operated, nine point jaw clutch which combines the simplicity of electric control and the high efficiency of jaw clutches. Famco's patent-applied-for electromatic clutch gives this 18 ton press added versatility and unprecedented ease of operation. It is activated by a simple touch of the foot control, or optional hand controls. The simple design of the electromatic clutch means lower maintenance costs than that with ordinary mechanical clutches.

A limit switch on the clutch housing provides absolute single stroke control. The convenient selector switch readies the press for either single stroke non-repeat, or continuous action, without stopping the press. A neutral position locks the clutch in place regardless if foot or hand controls are activated. An electronic timer converts the press into a fully automatic machine.

The frame of the Model 59 is of similar construction to that of other presses in the Famco line. It is constructed of close-grained, extra heavy cast semi-steel. It has a one-piece, heat-treated alloy crankshaft, split bronze-bushed main bearings, and greater ram area. Its semi-steel well balanced flywheel is tapered roll bearing equipped for friction free power. A hand oiling system may be installed at the factory or added later by the customer. The press is fitted with belt and flywheel guard and can be furnished with safety push button controls.

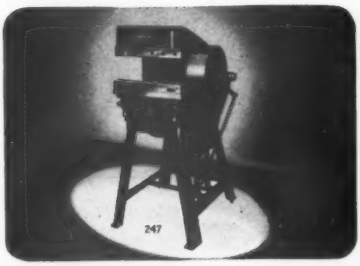


WHITNEY - JENSEN PRODUCTS
41 YEARS EXPERIENCE

No. 247—18" PRESS BRAKE

Production shops turning out quantities of small formings in large presses and job shops requiring a small brake, will find the No. 247 a cost reducing, space-saving piece of equipment. Capacity of the machine is 14 ga. mild steel over ⅞" 90 V die or 4½ tons.

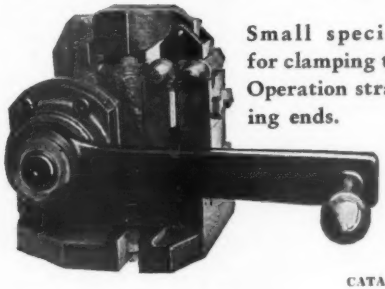
Strokes per minute—47
Throat Depth—6¼"
Throat Height—11½"



Send for Catalog

WHITNEY · METAL TOOL COMPANY
724 FORBES STREET • ROCKFORD, ILLINOIS

DESIGNERS • BUILDERS
ALL TYPES OF HOLDING FIXTURES
FOR MACHINE SHOP PRODUCTION



Small special fixture for clamping two shafts. Operation straddle milling ends.

CATALOG 941 AVAILABLE

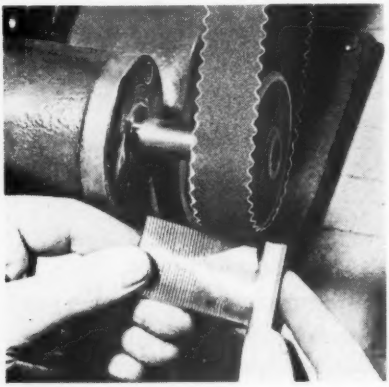
SWARTZ TOOL PRODUCTS CO., INC.
TELEPHONE WE-3-1522
13330 Foley • Detroit, Michigan

Representatives:
SYRACUSE
Arthur Irvine
CLEVELAND
Production Tool Co.
MILWAUKEE
Geo. M. Wolff Co.
HOUSTON-DALLAS
Engineering Sales Co.
CHICAGO
Ernie Johnson
PITTSBURGH
Tool Engineer Products
PHILADELPHIA
Morgan Tool Equipment Co.
LOS ANGELES
Technical Broaching Co.
NEW ORLEANS
Engineering Sales Co.
CINCINNATI
R. W. Pratt
BOSTON
A. R. Shevlin & Co.
TOLEDO
Peerless Tool Service Co.
CANADA
Firth Brown Tools, Ltd. (Galt, Ont.)

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Serrated-Edge Abrasive Belt Speeds Jet Blade Production

A serrated-edge grinding belt recently announced by Minnesota Mining and Manufacturing Co. is designed for the automatic precision grinding and finishing of jet turbine or compressor blades in a



single operation. The new belt is expected to also find wide application in the manufacture of hand tools, cutlery, and other products, requiring small-radius grinding and filleting previously done by hand.

In jet blade production, two separate steps—foil grinding and root grinding—were previously required to finish each of the more than 2,000 blades in a single jet engine.

Use of the new serrated-edge belt on an automatic grinder makes it possible to produce a completely precision-finished turbine blade in a single machine operation, in only half the time, and without need for further hand finishing. Finishing costs can be reduced by 20% to 50%, according to production methods.

In use, the scallops of the belt curve around the edges of the contact wheel, allowing fillet areas to be polished on the edge contour of the wheel. The belt is used on crowned, contoured, or round-edge wheels, or with shaped backup supports, and can be used either by machine or by hand. It is available in all standard abrasive belt constructions.

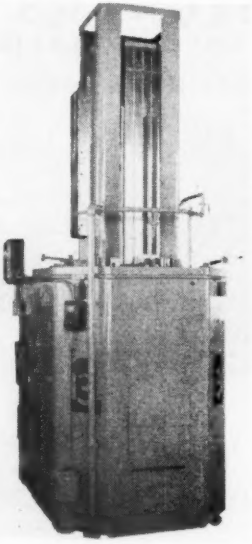
Multi-Operation Broaching

A new concept in broaching machine design has been incorporated in the model U-31 vertical hydraulic broaching machine developed by Acme Broach. It is a three-in-one machine having three slides grouped around and operated by a single central hydraulic cylinder. This arrangement facilitates the use of a single drive motor and hydraulic circuit.

The machine may be used by one, two or three operators simultaneously doing like or different operations at each work station. The controls are positively interlocked for operator protection.

The machine shown has a fifty inch stroke and is set up to broach a flat and a center key across the side of a tank part at the left hand station, broach two internal bolt pads at the central station and broach two parallel flats with a projecting central key at the right hand station.

It may readily be seen that under maximum production a multiple of different surface broaching operations can be done at each stroke of the machine.



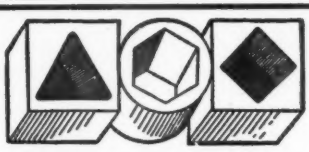
All three sides of this broaching machine may be tooled for the same operation or each slide may be tooled for a different operation. This makes possible progressive broaching on the same part by rotating the part from operator to operator.

Photo courtesy Acme Broach Corp.

Robert H. King, vice-president of the **Pivot Punch & Die Corporation** of North Tonawanda, N. Y., announces new appointments to the Controllers and Works Departments of the organization. This has been made necessary by the greatly expanded activities of the company which produces patent whip-sleeve and straight ground punches as well as special tools.

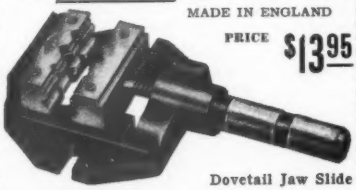
Paul J. Allwein has been appointed assistant to the works manager, and James G. Deckert assistant to the controller.

Mr. Allwein and Mr. Deckert are both 35 years of age, and join an expanded staff to comply with the greatly enlarged production, distribution, and sales efforts of the company.



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Penna.

The "NIPPY" Machine Vise
MADE IN ENGLAND
PRICE $13.95



Dovetail Jaw Slide
IMMEDIATE DELIVERY • GUARANTEED
• *Handy vise for general use in the machine shop*
Jaws of hardened steel have vertical and longitudinal vees, making the vise suitable for holding a variety of round and square sections on light drilling and milling operations. Small enough to fit in any tool box—large enough for sizeable work

Width of Jaws	3-1/4"
Depth of Jaws	1-3/16"
Opening—Upper Jaws	2"
Opening—Lower Jaws	1-3/4"
Weight	7 lbs.

DE WITT EQUIPMENT CO.
136 LAFAYETTE STREET • NEW YORK 13, N. Y.
Telephone: WALKER 5-4048

"THE ORIGINAL"
MAUSER MAUSER-PRECISION VERNIER CALIPER
$14.75 PPD

NEW EXCLUSIVE CAMLOCK AND GIB IMPROVEMENT INSTANTLY FIXES SETTING, PREVENTS SHIFTING, GUARANTEES SQUARENESS OF JAWS.
THE MAUSER TRADEMARK... IS YOUR PROTECTION.
MONEY BACK GUARANTEE
FOR MEASURING INSIDE, OUTSIDE, AND DEPTH.
3 GRADUATIONS
1/1000" — 1/128"
1/10 mm. IN BACK
GEO SCHERR CO. INC
200-1 LAFAYETTE ST. • N.Y.12, N.Y.

ALL THE DATA YOU NEED...

...at the flip of a single page
Make drill jig designing easier with this "Flip-a-page" catalog.
Free on Request
COLONIAL BUSHINGS INC.
FRASER, MICHIGAN

CHICAGO **DIES**
Complete Line of
PUNCHING and FORMING DIES
for All Sizes and Makes of
PRESS BRAKES
DREIS & KRUMP
MANUFACTURING COMPANY
7428 S. Loomis Blvd., Chicago 36, Ill.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

Reworked Tools Get New Life at Chrysler

More than 100,000 factory tools headed for "retirement" have been put through a reconditioning process by Chrysler Corporation in the past year to extend their useful lives several times beyond normal, thus cutting costs while at the same time conserving defense-vital metals. H. L. Weckler, Vice President and General Manager of Chrysler Corporation, explained how the operation of the company's non-productive material control department has brought about important tool savings.

Worn-out screw drivers, obsolete drills and thousands of other "tired" tools that have completed their stint on production lines are routed to the long rows of bins in the department.

Some of these tools are reworked to conform to new specifications; others are reissued to other departments of the company where they can be used effectively for other purposes; still others are sold to Chrysler suppliers who can use them in their operations, and, finally, those that cannot be repaired or reclaimed in any way add to the tonnage of Chrysler's intensive scrap metal drive.

Last year 70,000 separate items were supplied to plants from obsolete tool stores or surplus stocks held by other plants, and another 3,600 were reworked to fit new specifications. Savings ran into thousands of dollars. In another separate operation 24,000 grinding wheels were either reworked to provide fresh surfaces or substituted for other functions. Many other obsolete tools are sold to Chrysler vendors, who can use them in their operations.

One example is the 9/16" drill which is reworked to ½" to meet other specifications, or an old drill worn too short for its present job which is reground and used again on another assignment. In one case the stubs of solid carbide turning tools were saved from scrappage by brazing a steel shank onto them, thus restoring the tool to its original length.

Effective control of the operation is accomplished by routing all tool purchase requisitions through the non-productive material control department. By a careful screening of these purchase requisitions, the accompanying blueprints can be checked against tools in the obsolete stock bins. If an obsolete tool can be reworked to meet the blueprint specifications for not more than half the cost of the new tool, or if an obsolete tool used for another purpose will fit the new job, it is supplied to the requesting plant.

Those tools which are broken beyond repair or cannot be used in other operations become a part of the Company's scrap metal drive. Last year 788,000 pounds of worn-out tools were turned over to the Chrysler by-products department for disposal as scrap.

★ ★ ★ ★ ★ ★

Magnifying Time

A new 15 minute 16mm sound motion picture which provides a concise graphic demonstration of the ability of a high speed motion picture camera to "magnify time" has just been announced by the Eastman Kodak Company.

The film "Magnifying Time with the Kodak High Speed Camera" begins with the statement that time is no longer bound by the clock, that time control is now possible with a high speed motion camera.

To prove the point, and to show various applications of the camera, the film proceeds to illustrate how every movement from dropping an egg in a frying-pan to the implosion of television tubes can be slowed down to a snail's pace for leisurely study and analysis. Sequence in this series include motion picture studies of explosions, the operation of relays, the performance of a solenoid operated curtain, and vacuum coating of metals and plastics.

During the course of the demonstration the film points out that since the Kodak High Speed Camera exposes 100 feet of motion picture film in about three seconds— whilst the film passes the lens at about 50 miles an hour— time is multiplied by an approximate factor of 200. As a result any movement or action which is too fast for the eye to follow in the normal course of events can be readily studied on high speed film. This provides the engineer or researcher with the rare advantage of seeing exactly what takes place when things happen "as quick as a wink." The film points out that the camera literally "sees into the invisible".

"Magnifying Time" will be available on loan without charge to business, industries, schools, and organizations interested in the subject of high speed movies. Bookings can be arranged by addressing Camera Club and School Service, Eastman Kodak Company, Rochester 4, N. Y.

SUPERBORE

COUNTERBORES and drills...

IN STANDARD SIZES AND OVERSIZES ABOVE STANDARD DIMENSIONS

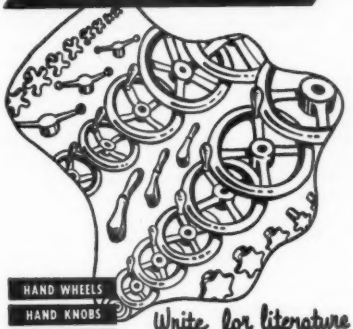
▼ SUPERBORE Counterbores provide that shade of difference when counterboring operations require oversizes from standard dimension holes. Precision grinding inside of flutes and pilots after heat treating, allow chips to flow out freely. The flutes are backed off to width of land to prevent heat generation, clogging or freezing. Each set is serial numbered. No. 500 consists of ten standard dimensions, counterbores and drills. No. 400 is 1/64" oversize and No. 300 is 1/32" oversize above standard dimensions. ORDER YOURS TODAY!

Write for Literature and Prices

TWENTIETH CENTURY MANUFACTURING CO.

3725 MONTROSE AVENUE CHICAGO 13, ILLINOIS

Tomco



HAND WHEELS
HAND KNOBS
MACHINE HANDLES
HANDLES
BALL HANDLES
SPECIALTIES

Write for literature

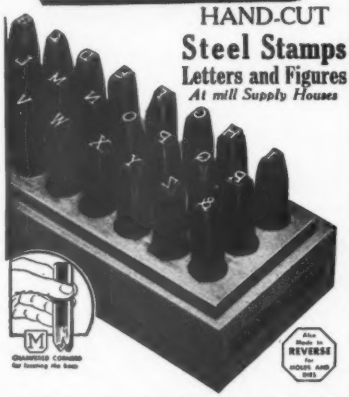
Tomco PRODUCTS CO.

1635 DOUGLAS AVE. RACINE • WISCONSIN

Blank or Machined - from stock

HOGGSON BRAND
Since 1849

HAND-CUT
Steel Stamps
Letters and Figures
At mill Supply Houses



HOGGSON & PETTIS MFG. CO.
141D Brewery St. New Haven 7, Conn.

RUNS COOL AT 38,000 RPM

Roto-Master Hi-Speed grinder makes carbide roughing and finishing available to every shop. Designed for operations requiring precise "finger-tip" control, in conjunction with carbide burrs and mounted wheels from 1/16" to ¼" dia.

MAKES CARBIDE ROUGHING AND FINISHING AVAILABLE TO EVERY SHOP

Roto-Master's SUPER COOLING system enables operating speed of 38,000 RPM. Operation requires practically no pressure . . . consequently grinder can be used continuously for hours without heating.

Operates on 110-120 Volt AC or DC, Any Cycle.

Try Roto-Master in your shop. If not completely satisfied return within 15 days at no charge. If not rated send check or M. O. for $32.50. Manufacturers' Agents Wanted.

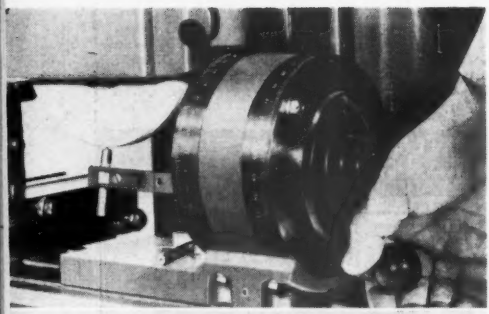
$32.50

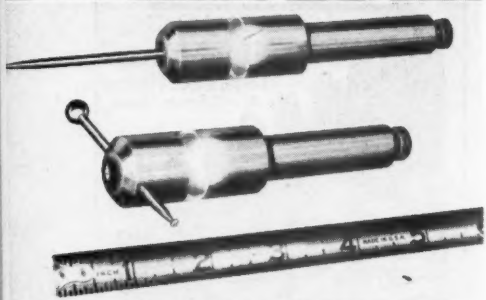
MASTER APPLIANCE MFG. CO., 4th at Ontario, Racine, Wisconsin

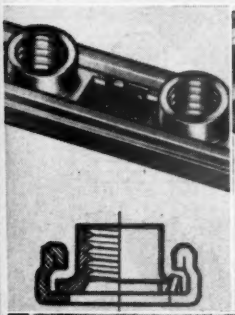
SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

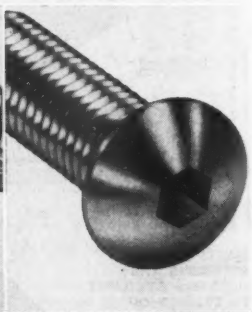
PROGRESS

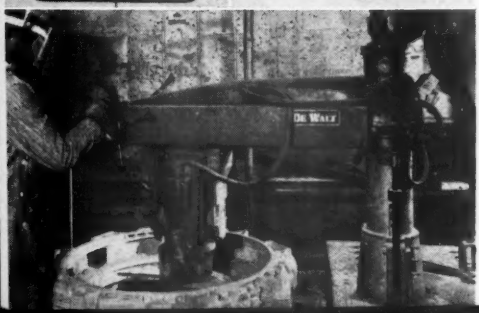
NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS











The Brown & Sharpe Continuous Radius And Tangent Wheel Truing Attachment is designed to form accurate radii on grinding wheels with accurate tangents at either or both sides of the radii with one movement of the diamond. Scales and verniers give accurate angular settings to within 10 minutes, and radii are easily set to thousandths of an inch, using a 2" micrometer and the setting gage furnished with the attachment. All bearings and bearing surfaces totally enclosed. Brown & Sharpe Mfg. Co., Providence, R. I.
Circle Inform-A-Gram No. A1.

A New Battery-Operated Center Finder that lights up when the desired point is located is being manufactured by the Art-Mil Machine & Mfg., Inc., 170 Hosack Street, Columbus, Ohio. It provides accuracy to within .0001" when used to locate working points or in slot and hole centering. Other suggested applications include surface gage comparator warning stop in close tolerance work, and dimensional gaging without feelers. It is furnished with an extra-long off-set point and ball stem, and is unaffected by spindle run-out.
Circle Inform-A-Gram No. A2.

A Button-Head Socket Screw with streamlined appearance and great strength is newly available. It has a low, hex socket head, and is made of heat-treated alloy steel. Having many applications, particularly where countersinking is impracticable, it is made in seven thread diameters from .164" to ⅝", and in four to seven lengths. All threads are precision rolled to the screw head. Write Box 600, Standard Pressed Steel Co., Jenkintown, Pa.
Circle Inform-A-Gram No. A3.

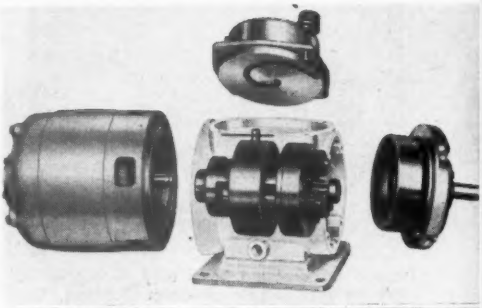
A New Multiple Lock-Nut Fastener, called the "Kaylock Gang Channel" has been introduced. A spring-steel lightweight locknut is used as the insert, having elliptical upper threads which are heat treated for flexibility. The channel portion is made in aluminum, with a double-vertical wall, ensuring maximum rigidity. The fixture is as narrow as a standard AN-366 anchor nut, and is available with standard or special hole spacing. Kaynar Mfg. Co., Inc., 820 E. 116th Street, Los Angeles.
Circle Inform-A-Gram No. A4.

New Metal Cutting Machines have been developed by DeWalt Inc. The DeWalt ME-2F is capable of cutting risers and gates up to four inches in diameter in iron castings, two inches in nickel and steel castings. The ME-2F is rated at ten horsepower. A companion model of fifteen horsepower is also made, which can cut stainless steel two inches thick and 96" wide. DeWalt Inc., Lancaster, Pa.
Circle Inform-A-Gram No. A5.

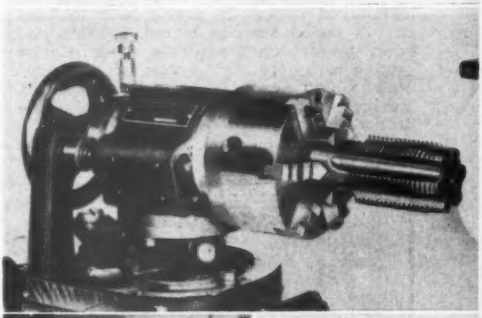
ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

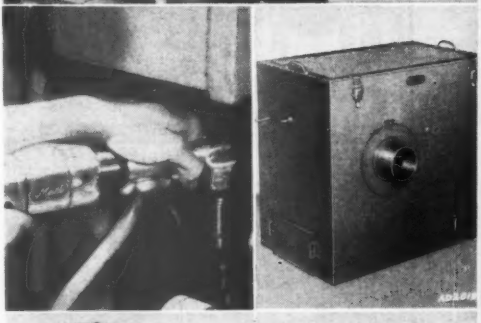
A Model 18 Variable Speed Transmission has been added to the Graham range. This model is lighter and is designed for operation at 1800 RPM input without the use of auxiliary spring loading. It provides foolproof overload protection and has a wide speed range from any desired maximum to zero with hairline accuracy of speed holding and the ability to reset exactly to a desired speed. Micrometer control is furnished as a standard fitting. Graham Transmissions Inc., 3754 N. Holton Rd., Milwaukee 12, Wisconsin.
Circle Inform-A-Gram No. A6.



A New Six Jaw Chuck is available for the D-S radial relief grinding fixture. The chuck is a 4" Buck model specially adapted for the D-S fixture. Perfect alignment is assured. A precision ground shank with adjustable backplate has been added to the chuck body, giving concentricity within .005" total indicator runout. D.S. Grinder Div. Royal Oak Tool & Machine Co., 619 E. Fourth Ave., Royal Oak, Mich.
Circle Inform-A-Gram No. A7



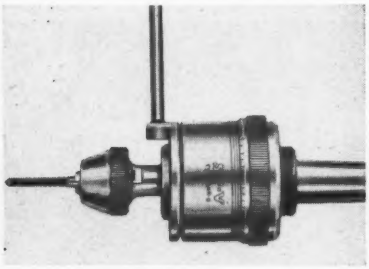
"Mall" Pneumatic Angle-Head Drill makes close quarter drilling easier. The angle head is unusually compact, and can be swivelled to any position relative to the throttle by simply loosening a single nut. Capacity is ½", with a Jacobs ½" chuck, and either button or lever throttle styles are optional. An automatic oiler eliminates the need for line oiling. Mall Tool Co., 7740 So. Chicago Ave., Chicago 19.
Circle Inform-A-Gram No. A8.



The Model 520 "Dustkop" is believed to be the smallest dust collector of its capacity having a self-contained cyclone separator. Recommended for collecting dust, dirt, lint, chips and shavings the new model 520 makes an ideal "under the bench" installation. It is especially designed for remotely located individual dust sources such as grinders, sanders, buffers, and polishers. Aget-Detroit Company, 213 Main Street, Ann Arbor, Michigan.
Circle Inform-A-Gram No. A9.

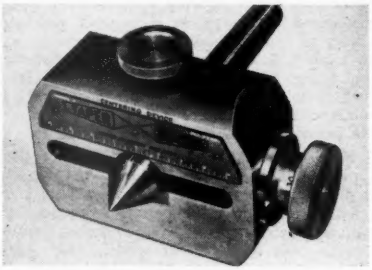
Clausing 12" Lathes are now being made by the Atlas Press Co., with refinements of design and construction. The new 6300 features a forged, ground steel spindle, with 1" collet capacity, A.S.A.—L-00 tapered key drive nose, choice of countershaft or variable speed drive, and enclosed headstock, quick change gearbox, and apron. Specifications: 24", 36", and 48" between centers; 12¾" swing over bed, 7½" over saddle; thread cutting range: 4 to 224 standard, right or left. Clausing Div., Atlas Press Co., 2312 N. Pitcher Street, Kalamazoo, Michigan.
Circle Inform-A-Gram No. A10

The S. P. V. Is A New Tapping Attachment which offers performance advantages. Risk of scrapping expensive parts is eliminated, there being no possibility of double threading pre-



tapped holes. Blind holes may be tapped in light metal at spindle speeds of 2500 rpm. The device has an axially sliding body mounted in two needle bearings to reduce stress and give greater tap life. It is fitted with a mechanically operated system of automatic reverse, and easily adjustable torque drive. Design is compact, and all moving parts are carried in ball and needle bearings. Eric S. Johnson Co., 230 E. Ohio St., Chicago 11, Ill. **Circle Inform-A-Gram No. A11.**

A New Lathe Tailstock centering device and taper turning attachment is made by Master-Taper Co., in two sizes, one with a No. 2 Morse Taper shank and the other with No. 3, 4, or 5. This range of sizes is applicable to lathes from bench type to extra-heavy duty. The attachment fits into the tailstock, eliminating the need for special fitting. The graduated Micro-Screw actuates the 60° center in either direction with positive locking in any position.



Tailstock alignment is speedy, and tapers up to 3" per foot may be turned using the face-plate graduations. Write Master-Taper Co., 4531 N. Beacon Street, Chicago 40, Illinois. **Circle Inform-A-Gram No. A12.**

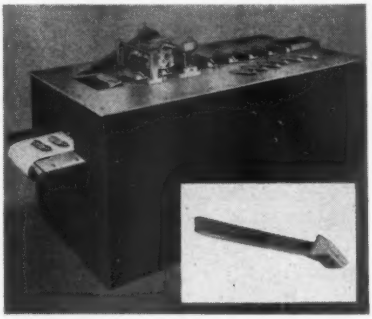
THREAD MEASURING MADE EASY
WITH NEW 60° THREAD TRIANGLES

Quickly checks all 60° standard and special threads from 4 to 56 pitch . . . ANY O.D. Perfect class 3 or 4 fit. No "fancy" calculations . . . just add a constant to O.D. That's all.
Comes complete with chart.
WRITE FOR BULLETIN
$8.60 PPD
MONTGOMERY & COMPANY INC
53-T PARK PLACE • NEW YORK 7 N.Y.

Severance Regrinding Service
☆ HIGH SPEED and CARBIDE ☆
CONSERVE STRATEGIC MATERIAL!
YOUR DULL ROTARY FILES — CAN BE GROUND INTO — NEW MIDGET MILL TYPE TOOLS LIKE THIS
WE REGRIND: MIDGET MILLS, COUNTER SINKS, END MILLS, MILLING CUTTERS, PINKING CUTTERS ETC.
START USING THIS MONEY SAVING SERVICE NOW!
Severance Tool Industries Inc.
730 Iowa Ave., Saginaw, Mich.
Catalog Sent On Request

Specify DESTACO FEELER STOCK
For precision fitting, checking clearances, inspection and production work. Available in 12" strips, ½" wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25 foot coils. 14 standard thicknesses from .0015" to .015".
DESTACO DETROIT STAMPING COMPANY
344 MIDLAND AVENUE • DETROIT 3, MICHIGAN

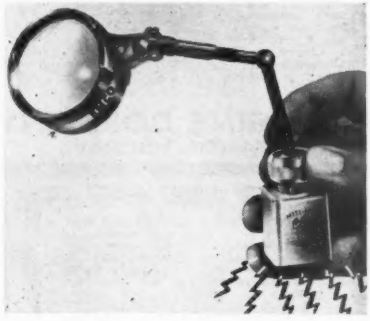
Gottscho Markocoder Imprinting Machines have been modified and adapted to production line imprinting of defense products. Set up in the production line, machines mark products between stations automatically. Illustration



shows marking of oddly shaped jet engine parts. Feeding, handling, separating, imprinting and discharging are completely automatic. A booklet is available from Adolph Gottscho, Inc., Hillside 5, New Jersey

Circle inform-A-Gram No. A13.

A Combination Magnetic Base Holder for magnifiers and dial indicators which mounts on curved or flat surfaces instantly, has been announced by Enco Mfg. Co., 4524 W. Fullerton Ave., Chicago 39, Illinois. The equipment is called "Miti-Mite" No. 120. The base has a pull of approximately 50 lbs., and has a flexible ball and swivel socket assembly attached, which permits the setting of the magnifier at any angle or position, and precise positioning of dial indicators. All attachments are hard-



ened, and include two different diameter posts, an extension rod, and an adaptor to take 5/32" stud type indicators as well as the magnifier.

Circle Inform-A-Gram No. A14.

Precision Feeds For All Presses

- Easily installed on any press
- Can't slip. Reverse instantly
- Feed in thousandths
- Maintain original setting. No ratchets or pawls to wear down and affect feed spacing.

Write for descriptive literature TODAY.

ROLL-FEEDS CORPORATION
Pawtucket, Rhode Island
An Electrix Affiliate

World's Largest Producer of LOW COST, PRECISION DIE CUT STAMPINGS IN SMALL LOTS

The Stamping illustrated was produced by our patented process at a cost of:

$58.00 for the first 100 pieces
8.30 for each subsequent 100

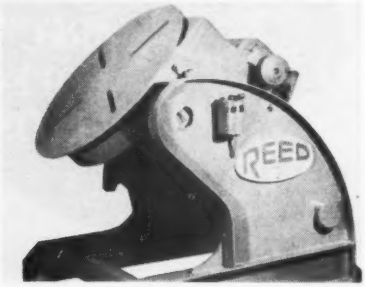
plus actual market price of material. Your stampings of any size or shape up to 3/8" thick can be produced in proportion to this price.

DAYTON ROGERS
Manufacturing Company

2833 13th AVE. SO.,
MINNEAPOLIS 7, MINNESOTA

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

New Design Welding Positioners are illustrated. Models P-10R and P-25R with 1000 and 2500 pound capacities are available. A compact, three-in-one table tilting frame is used,



which eliminates inefficient power trains used on older type equipment, and minimizes backlash and lost motion in the table rotation system. Rotation speed can be varied through a 10 to 1 speed range by a handwheel adjustment. Hand or power table tilting through a 135 degree angle is optional. Write Reed Engineering Company, 1003-17 West Fairview Avenue, Carthage, Missouri.

Circle Inform-A-Gram No. A15.

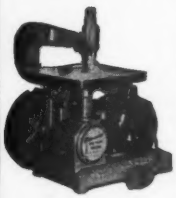
A Self-Contained Bench Model Hard Chrome Plating Unit has been developed. It requires a space of only 2' x 3', yet all controls, transformers, rectifiers, switches and heating elements, including the plating tank; are contained within the unit. A current source and duct outlet are the only connections required for immediate operation. The unit is called the "Cro-Plater 100", it has angle iron con-

struction for rigidity, and the tank is lead-lined Armco iron. Write the Cro-Plate Company, Inc. 747 Windsor Street, Hartford, Conn., for details.

Circle Inform-A-Gram No. A16.

MILWAUKEE DIE FILERS PROFILE GRINDERS

Gives you more value for your money!



DIE FILER

Model FS shown performs all die making operations. Equipment includes File Roller Support Overarm in addition to overarm shown.

PROFILE GRINDER

Available in two models, STANDARD and HIGH SPEED. Features ½ HP Motor for non-stalling power, Collet Chuck for extreme accuracy and compound tilting table.

RICE PUMP & MACHINE COMPANY

228 N. MILWAUKEE ST., GRAFTON, WISCONSIN

SAVE TIME and MONEY with GARBERDING

STOP-PINS AVAILABLE IN 5 SIZES

FINGER STOPS IN 3 SIZES

STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices. GARBERDING FINGER STOPS made in uniform width to fit any standard width slots. Just grind ends to fit.

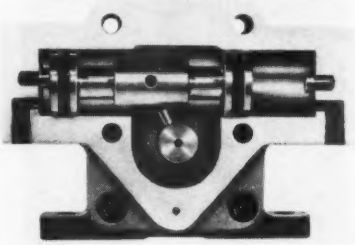
Write for literature.

TWENTIETH CENTURY MANUFACTURING CO.

3720 MONTROSE AVENUE CHICAGO 18, ILLINOIS

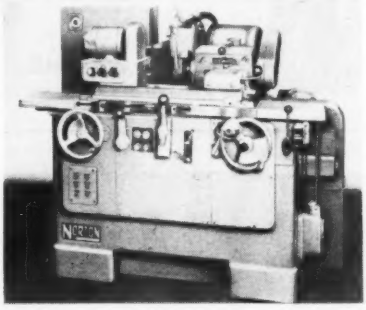
PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

The POV Power Operated Valve is available in six sizes, suitable for air, oil, and water operation, with option of finger, cam, toe, or solenoid pilot controls. It is essentially a standard four-way valve, but disc rotation is accomplished by a piston moved by the operating fluid pressure of the main line, and controlled by small pilot valves, suitably located and actuated. It is designed for use where hand and foot operated valves cannot be em-



ployed. Bulletin 1000, Ledeen Mfg. Co., 1600 So. Pedro St., Los Angeles 15.
Circle Inform-A-Gram No. A17.

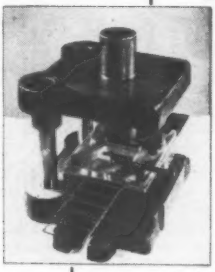
The Norton 4" Type CTU Grinder is newly developed for machining small cylindrical parts. It is available as plain or semi-automatic in work length capacities of either 12" or 18". Wheel feeds and set-up are simplified by a clickcount indexing mechanism on the handwheel, each click representing .0001" work diameter reduction. Grinding and truing table speeds are independently adjustable, and no resetting of speeds is necessary when chang-



ing from one to the other. Automatic or manual control of work rotation and coolant flow is also provided. The semi-automatic version has an automatic, adjustable grinding cycle controlled by a single lever. A selector converts for traverse grinding. Norton Co., 1 New Bond Street, Worcester 6, Mass.
Circle Inform-A-Gram No. A18.

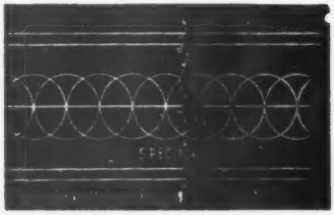
NEW!

HEAVY SIZE WEST AUTOMATIC DIE STOP



West's Automatic Die Stop is now available in a large size. This Stop works with the same positive action as the old light model which has been in use over 10 years. It features a one-piece arm, built-in coil springs, and hardened steel throughout. Write for descriptive folder and template.

R. C. West Tool & Die Corporation
DEPEW, NEW YORK



DYKEM STEEL BLUE
STOPS LOSSES
making dies and templates

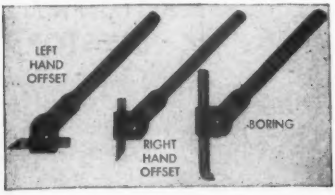
Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY
2303L North 11th Street • St. Louis, Mo.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

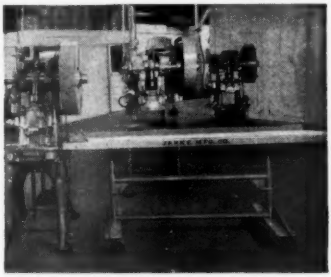
The "Walton-American" Tool Holder offers unique versatility of operation. The head swivels round in a complete circle, yet gives a perfect grip on square bits or round boring



bars. Thus it may be set for any straight, right hand, or offset left hand position. Not only is the bit gripped top and bottom, but it is held so that no lateral motion is possible, and the jaws will not break high speed tool bits or Stelite. The Walton-American tool holder is made in four sizes, providing a tool bit capacity from ⅛" in the smallest to $\frac{7}{16}$" in the largest size holder. Write Mr. K. W. Weeks, the Walton Company, P. O. Box 5, Elmwood Branch, Hartford 10, Connecticut.

Circle Inform-A-Gram No. A19.

A New Stock And Feeder Cart, the "Steelmobile", has been produced for handling sheet steel and bar stock. Table height is adjustable from 32" to 42", with an incline to a maximum of 45° to suit various press heights and angles and insure accurate feeding. Rugged steel welded construction and good design give smooth stability under any load to 2000 lbs. All lock and pivot pins are hardened, extra heavy end flanges are mountings for oilers



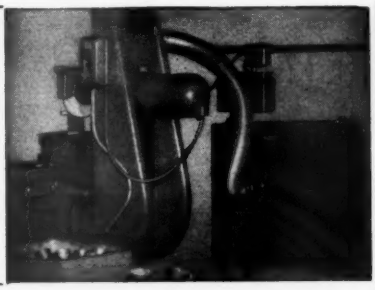
during feeding operations. Details from Jarke Mfg. Co., 5407 North Broadway, Chicago 40, Illinois.

Circle Inform-A-Gram No. A20.

T NUTS
Stud Sets
•
Strap Clamps
•
SURE GRIP STEP BLOCKS
TIETZMANN TOOL CORP.
315 N. Main St., Englewood, Ohio

HARDNESS TESTING
has been done with the
SCLEROSCOPE
since 1907
•
THE SHORE INSTRUMENT & MFG. CO., INC.
9025 Van Wyck Avenue
Jamaica 2, N. Y.

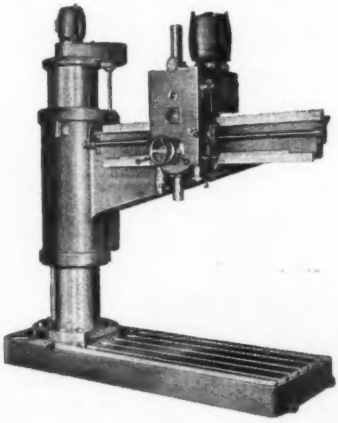
STOP DUSTS
INSTANTLY *with*
DUSTKOP
Available from stock of 22 standard models
300 cfm to 10,000 cfm
Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—No Obligation.
AGET-DETROIT CO.
213 Main St. Ann Arbor, Michigan



A New Dial Bore Gage designed for quick and accurate inspection of small diameter bores from .250" to .375", called the Model No. 00, has been introduced by the Standard Gage Co. It will check tolerances up to .005", and utilizes interchangeable "centering size" discs. These are locked to the head of the

instrument with a clamping nut. The dial indicator has high visibility graduations of .0001". The plunger actuating the indicator is sapphire tipped and the centering size discs are chrome plated to assure long wear life. Operation is precise and very simple. The gage is entered at an angle to allow the extended plunger to clear the bore, then rocked to cause plunger to pass a square position. Apply Standard Gage Co., Poughkeepsie, N. Y. **Circle Inform-A-Gram No. A21.**

Series L "Maxim" Heavy Duty Radial Drills are announced by the Parker Machine Co. Three mods. are made, with 4'3", 5'10", and 9'1" arms. Column diameters 15¾" and 17½" respectively. A drilling capacity of 2" to 2½" in mild steel and 20 spindle speeds from 32-2500 rpm and 25-2000 rpm are also

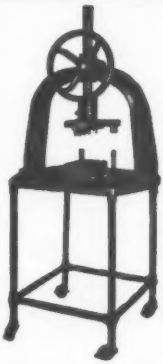


specified. Accelerated reverse for tapping is obtained by friction clutches. Write to Parker Machine Company, Inc., 158 Pioneer Street, Brooklyn 31, New York, for illustrated bulletin. **Circle Inform-A-Gram No. A22.**

LINDERME
2-SPINDLE ADJUSTABLE DRILLING HEAD

For long & short runs.
Drills, taps, metal, wood, plastics. 2-minute set-up on most drill presses; quick, accurate adjustment, variety of models ½" to 12⅝" centers. Fixed center distances. Multiple Heads designed and built to meet your requirements.
Available with GM Sleeves, Morse taper or drill chucks.
Write for full information.

LINDERME ENGINEERING & SALES
8132 PURITAN DETROIT 21, MICHIGAN



COMPLETE THE DIE-SET AT YOUR BENCH

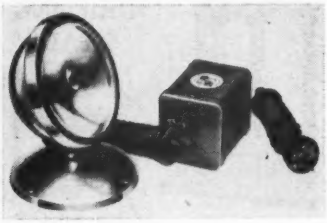
Lacey Die-Set Machine

Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the diemaker to complete a die-set right at his bench . . . saves toolroom and handling costs. Ask today for full details.

Sole Distributors
MOORE SPECIAL TOOL CO., INC.
726 Union Avenue Bridgeport 7, Conn.

SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

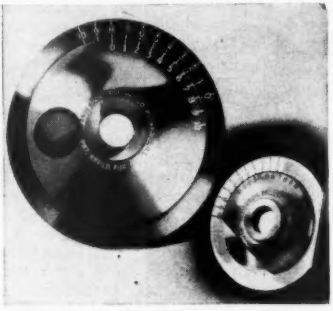
The "Dyna-Ray" Spotlight gives intense illumination where critical visibility is needed for fine production control and close inspection. At five feet, type M-114-S Dyna-Ray, which has a beam spread of 4½ degrees by 5½



degrees, casts a circular spot six inches in diameter with an illumination intensity of 1000 foot candles. This brightness level is roughly 150 times as high as that provided by the non-sealed, painted reflector spotlights formerly used for the same purpose and operating at three times the power consumption. The beam is shielded to avoid striking workers' eyes, and the fixture positively sealed against damp and dirt. Dormitzer Electric & Mfg. Co., Inc., 5 Hadley Street, Cambridge, Mass.

Circle Inform-A-Gram No. A23.

The Anderson Bros. "Speedi-Balancer" is a new type aid to static balancing. Its use enables grinding, polishing, and buffing wheels to be removed from their machines and replaced without adding or removing weights. The wheel is marked showing the setting of the discs, and anytime the wheel is removed



or replaced on the lathe, the balancer is merely set according to the marks. The Speedi-Balancer is made to fit arbor sizes from ½" to ⅞" and from 1" to 1¼". Further information is available by writing Anderson Bros. Mfg. Co., 1907 Kishwaukee St. Rockford Ill.

Circle Inform-A-Gram No. A24.

Enjoy GREATER EFFICIENCY, INCREASED PRODUCTION with

ROUSSELL F

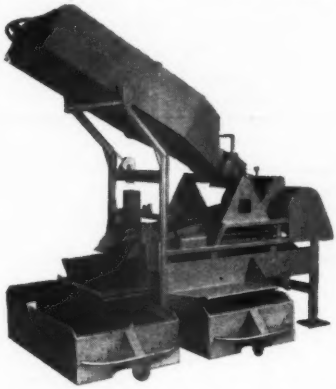
Open Back Inclinable, Adjustable Bed Horning, Deep Throat presses to meet all your requirements. Write for descriptive literature TODAY.

SERVICE MACHINE CO.
7627 S. Ashland Ave., Chicago 20, Ill.

- - For Sale - -
TUNGSTEN ROUNDS
(18-4-1)
36 Bars — 2.739" (+ — .002)
Ground and Polished
We have about 9,000# available in
Carpenter "Star Zenith" and
Crucible "Rex AA"
"NO CMP REQUIRED"
Certificates Available
Priced At Mill Base
GLOBE INDUSTRIES
1815 Franklin St. Detroit 7, Mich.
WOodward 1-8277

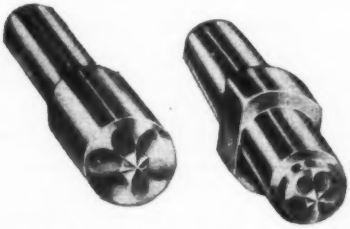
ENCLOSURE SAFGUARD FOR PUNCH PRESSES
Strand Mfg. Co.
DEPT. B, P. O. BOX 762
LOS ANGELES 44, CALIFORNIA

This New Separator Is More Effective in removing parts from deburring and finishing chips, and for grading the different sizes of chips. Greater compactness is obtained by locating the hopper at the top of the machine, floor space being cut by one-half, parts separation achieved without danger of damaging, whilst the two-deck carriage permits grading of three sizes of chips at one time. The machine is activated by an eccentric, and may be converted to chip grading by the simple turning of a cam. Gravi-Flo Corporation, 400 Norwood Ave., Sturgis, Mich.



Circle Inform-A-Gram No. A25.

Diamond Cutters have now been adapted to use in engraving, routing, electric marking, and acid etching machines. "Panto" diamond cutters are faceted to a sharp point, and make a very clear mark up to a depth of .005", depending on material and degree of hardness. The cutters have been adapted to the pantograph type machine, and previous objections to acid etching, sand blasting and electric marking are overcome. Straight and taper shank styles. H. P. Preis Engraving Machine Co., 282 Industrial Branch, Hillside, N. J.



Circle Inform-A-Gram No. A26.

Miccro Supreme
LAY-OUT AND IDENTIFICATION DYE
7 COLORS
For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.
MICHIGAN CHROME & CHEMICAL COMPANY
6340 E. Jefferson Ave. • Detroit 7, Mich.

REID TOOLING AIDS
Quarter-turn Screws, assorted sizes.
T-Nuts, case-hardened for all standard T-slots.
Coupling Nuts, case-hardened.
Studs — also T-slot bolts.
Jig feet or rest buttons — hexagon and circular.
Also hand wheels, machine handles, levers, cranks, fixture units, magnetic parallels, machine vises, cast iron knobs. Write for catalog and prices on complete REID line.
REID TOOL SUPPLY CO.
709 Baker St., Muskegon Heights, Michigan

— CONTRACT TOOLING AND PRODUCTION —

Illinois

DRESEL-BETZ CO.
Belleville, Ill.
Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings.

Michigan

DAVIS TOOL AND ENGINEERING CO.
19250 Plymouth Road, Detroit, Michigan, VErmont 5-6000. Tools and Dies, Special Machinery. Sheet Metal Stampings and Assemblies.

New York

AMERICAN MEASURING INSTRUMENTS CORP.
The AMIC Bldg., 21-25 44th Ave., Long Island, City 1, N. Y. Jigs, fixtures, gages, dies, precision parts.

CONRAD & MOSER
2-23 Borden Ave., Long Island City, N. Y. Machine Tools & Molds, Parts & Machines Aluminum Cast Parts, Aluminum Sheet Formed Housings.

Ohio

CLEVELAND UNIVERSAL JIG COMPANY
13404 St. Clair Ave., Cleveland, O., MUlberry 1-2880
DESIGNERS AND BUILDERS
Jigs and Fixtures Special Machines
Production Engineering
Complete Plant Routing and Tooling

GENERAL DIE & TOOL CO.
2067 W. 55th St., Cleveland, O., WO 1-4736 Dies, Tools, Jigs, Fixtures, Light Stampings, Special Machinery Manufacturing.

H & P DIE STAMPING CO.
13947 Triskett Rd. Cleveland 11, Ohio
PRECISION DIES, JIGS & FIXTURES
Quality Stampings
Bus & Trailer Parts

THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, O. Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 1-2440 & 1-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring.

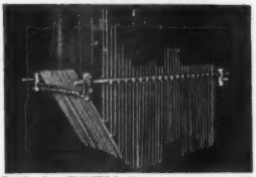
NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, Bedford 2-1234. Tool Makers—Short Run Production Work.

THE PHOENIX MACHINE CO.
2711 Church Ave., Cleveland, O., CHerry 1-1048. Contract Grinding, Boring and Planing. Lester-Phoenix Die Casting and Plastic Molding Machines.

A. P. SCHRANER & CO.
3338 Payne Ave., Cleveland, O., HEnderson 1-8644. External Cylindrical Lapping Machines, Special Machinery, Tools, Dies, Jigs, Fixtures.

SKYLINE TOOL & GAGE COMPANY
4125 Newark Avenue • Cleveland, Ohio
Telephone: ATlantic 1-2019
DESIGNERS and BUILDERS
Jigs, Fixtures, Dies, Special Machines and Parts
Short Run Production

ADJUSTABLE ROD GUARD
for Power Presses



HUMM SAFETY EQUIPMENT CO.
MFGR. OF COMPLETE LINE OF PRESS GUARDS
253 Sheffield Avenue • BROOKLYN 7, N. Y.

which of these metals do you engrave?

Brass, copper, nickel-silver, die cast metal, etc. The PREIS-PANTO Model CNP engraver will engrave lettering or design on all of these metals; no motor—operates by hand as easy as tracing a drawing.

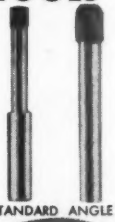
PANTO

Write for Data CNP.

H. P. PREIS ENGRAVING MACHINE CO.
647 Route 29 Hillside, N. J.

RAYMAC Solid Carbide GRINDING TOOLS

Raymac Solid Carbide Grinding Tools increase production and lower costs. They mill hardened metal accurately and do not wear fast or burn the metal.



STANDARD ANGLE

Write for Catalog No. 12

BUSHING TYPE

RAYMAC
MANUFACTURING COMPANY INC.
3729 CASS AVENUE, DETROIT 1, MICH.

Columbia

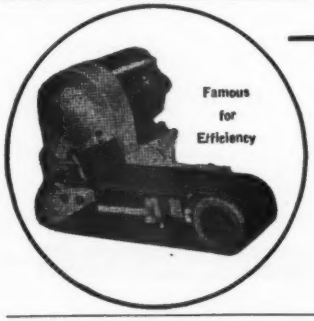
TOOL STEELS FOR
All Tools for All Purposes

HIGH SPEED
CLARITE VANITE
MAXITE MOLITE

TOOL COLUMBIA STEELS

COLUMBIA TOOL STEEL COMPANY
Main Office & Works
Chicago Hgts. 5, Ill.

• *HIGH SPEED GRINDING* •



STANDARD D-4 ABRASIVE BAND GRINDER

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit!

Other styles and sizes in New Manual on finishing — Write today

WALLS SALES CORP.
333 NASSAU AVENUE BROOKLYN 22 NEW YORK

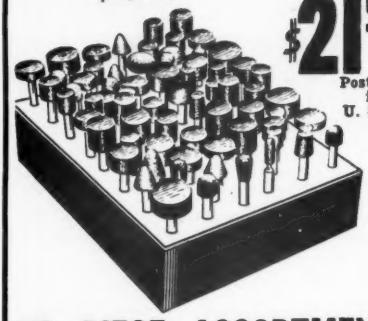
SEE ADVERTISERS INDEX, PAGE 153, FOR KEY NUMBERS

72 ABRASIVE WHEELS & POINTS

BRAND NEW PERFECT FIRST QUALITY MOUNTED ON 1/4" STEEL MANDRELS

SAVE UP TO $25.00

ONLY $21.50 Postpaid in U. S. A.



72 PIECE ASSORTMENT

ON 1/4" MANDREL

12 POPULAR SIZES & SHAPES—6 EACH On 1/4" Mandrel

	Dia.		Depth			Dia.		Depth
1.	1 1/2"	x	1/2"	7.		3/4"	x	1/2"
2.	3/4"	x	1/4"	8.	A-61	3/4"	x	1/4"
3.	3/4"	x	1/2"	9.	A-90	1/2"	x	1/2"
4.	1/2"	x	3/4"	10.	A-41	5/8"	x	5/8"
5.	3/4"	x	3/4"	11.	A-111	1"	x	1"
6.	1"	x	1/2"	12.	A-24	1/4"	x	3/4"

Make no mistake. Do not let the unheard of low price mislead you. This is NOT "surplus" goods, inferior merchandise or seconds. Every one of the Wheels and Points is brand new, first quality and perfect. The type of mounting, quality of steel mandrels, grade of abrasive materials are identical to the finest on the market. Only because of our buying power, low overhead and small margin is such a sensational bargain possible.

IDEAL FOR ALL INDUSTRIAL PURPOSES

Plants all over the U. S. have been using Schupack wheels and points for years with excellent results. Our

144 ABRASIVE WHEELS & POINTS

BRAND NEW PERFECT FIRST QUALITY MOUNTED ON 1/8" STEEL MANDRELS

SAVE $65.10

ONLY $28.50 Postpaid in U. S. A.

ACTUAL LIST VALUE $93.60

Here's What You Get—List Value $93.60
Our Price $28.50—You Save $65.10

16 MOST USEFUL SIZES—9 OF EACH SIZE

Style	Quantity	List Price	Style	Quantity	List Price
W-204	9 @ 65¢	$5.85	B-41	9 @ 80¢	$7.20
W-182	9 @ 50¢	4.50	B-44	9 @ 70¢	6.30
W-201	9 @ 55¢	4.95	B-70	9 @ 70¢	6.30
W-200	9 @ 55¢	4.95	B-104	9 @ 70¢	6.30
W-185	9 @ 55¢	4.95	B-61	9 @ 75¢	6.75
W-203	9 @ 60¢	5.40	B-135	9 @ 55¢	4.95
W-175	9 @ 55¢	4.95	B-111	9 @ 75¢	6.75
B-121	9 @ 70¢	6.30	B-101	9 @ 80¢	7.20

GUARANTEE

If after 10 days you are not fully convinced that this is the greatest wheel and point value in the industry, return the set at no cost or obligation on your part.

EACH ASSORTMENT COMPLETE IN HANDY, STURDY CONTAINER AT NO EXTRA COST. SATISFACTION GUARANTEED!

assortment includes the most popular sizes and types. However, we can supply ANY ASSORTMENT you want. List the types and sizes and we will fill your order at no extra cost.

10 DAY FREE INSPECTION OFFER

Drop us a line on your stationery, SEND NO MONEY. We will ship any assortment to any rated concern in America on approval. We invite you to make any comparison you like.

ILLUSTRATED CATALOG SENT FREE ON REQUEST!

SCHUPACK SUPPLY COMPANY · 7331 Cottage Grove Ave., Dept. TD-1 Chicago 19, Ill.

To step up hand-grinding production

use a DUMORE®

a tool... not a toy

Don't be misled by extravagant claims for underpowered hobby-type tools. Manufacturers who want top tool performance use DUMORE Flexible Shaft Tools.

These powerful, high-speed tools slash costs of light hand finishing operations . . . grinding, burring, filing, sanding, lapping, chamfering . . . on ferrous and nonferrous metals as well as wood, plastics and ceramics.

The light, easily manipulated handpiece permits close, accurate control... reduces operator fatigue for steadier production. Ideal, too, for multiple drilling setups on close centers. No matter what your job requirement or your shop budget, Dumore has the right flexible shaft tool for you.

Choose from a complete range of 3 sizes

POWER-FLEX ¼ hp — 20,000 RPM.

DUO-FLEX — 1/15 hp lo-speed, 500-3,500 RPM hi-speed, 3,000-15,000 RPM.

UNI-FLEX 1/15 hp — 15,000 RPM.

Furnished with heavy-duty, oil-resistant flexible shafts and Dumore quality, continuous-duty rated motors. Three sizes — 1/15 to ¼ hp. Power-Flex puts the power on the bench. Other models can be suspended from any convenient hook.

Ask your nearby industrial distributor for a demonstration of this quality line of Dumore flexible shaft tools or write.

THE DUMORE COMPANY

1313 Seventeenth Street • Racine, Wisconsin

over 3,000,000 parts

produced on one machine with

BALAS PUSHERS

BALAS also makes:

- Solid Collets
- Special Collets
- Master Collets
- Squirrel Cage Pushers
- Master Pushers
- Feed Fingers

This particular "run" was reported by a leading automotive and aircraft part manufacturer. Over 3,000,000 parts were produced using Balas Pushers in a Davenport machine...and no pusher failure was encountered. It is not an unusual record for BALAS!

You, too, can obtain outstanding production records with Balas Pushers. They are precision machined from solid bar stock of selected quality. In addition, rigidly controlled heat-treating assures proper spring tension and a hard bearing area.

Use Balas Pushers and be sure of more production and less stock waste. Whether your problem is simple "feeds" or difficult jobs such as long feed-outs, high speeds and scratchless operation, Balas Pushers are essential in turning out good work...and turning it out fast. For peak production—Best Buy Balas!

BALAS COLLET MANUFACTURING CO.

1553 EAST 27th STREET CLEVELAND 14, OHIO

WORLD'S LARGEST MANUFACTURER OF COLLETS EXCLUSIVELY

BALAS

his issue: 2-Spindle Tooling • Milling Fixtures • Automatic Dies